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THE UNIVERSITY OF ALBERTA

A STUDY OF BEHAVIOURAL PATTERNS ASSOCIATED  
WITH CREATIVE ABILITY AT THE HIGH SCHOOL LEVEL

BY



AGNES G. BUCKLES

A THESIS

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The undersigned hereby certify that they have read and recommended to the Faculty of Graduate Studies for acceptance, a thesis entitled, "A Study of Behavioural Patterns Associated with Creative Ability at the High School Level," submitted by Agnes G. Buckles in partial fulfillment of the requirements for the degree of Master of Education.





## ABSTRACT

The present study investigated behavioural patterns of grade eleven students identified as being creative. Relationships among intelligence achievement and three factors of creativity: fluency, flexibility, and elaboration of original ideas were also examined.

Information on 227 grade eleven students was collected in the fall of 1966. After a pre-test to measure creative ability the students were divided into high, middle, and low groups according to their scores on the pre-test. Six months later a post-test in creativity was also administered. This test was used to compare two groups of students to investigate whether or not creative ability could be increased under certain experimental conditions.

The major findings of the study were as follows:

1. There were significant differences between students of high creative ability and students of low creative ability. The high creative students had broader interests, considered themselves above average in creative thinking, took more lessons in fine arts subjects, and chose occupations such as inventor, writer, and artist. Many of the fathers of the students in the high creative group were skilled laborers; the fathers of many of the students in the low group were professionals. The students in the low creative group preferred the music of the hit parade, preferred to study independently and chose to serve their organizations for monetary gain.
2. In general there were no significant correlations between intelligence and creativity for the students in the study.
3. There were statistically significant correlations between factors



3. There were statistically significant correlations between factors of intelligence and achievement in English. There was a significant correlation between the creativity post-test and achievement for the total population but there were no significant correlations between verbal and non-verbal creativity tests and achievement for the high and low creativity groups.
4. Although the experimental group and the non-experimental group differed on the mean pre-test creativity scores, they did not differ on mean post-test creativity scores when scores on the pre-test were controlled statistically.



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A.B.





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## CHAPTER I

### INTRODUCTION TO THE PROBLEM

Educators are interested in new dimensions of learning. The unprecedented expansion and constant revision of knowledge demands new methods of education to meet the needs of modern youth. To prepare young people to live productive and satisfying lives in a changing society is one of the fundamental problems of educators. Memorization of facts, correlation of data, and convergent thinking can no longer be the main activity of the students. Anderson (1959) quotes Carl Rogers:

Unless man makes new and original adaptations to his environment as rapidly as his science can change his environment our culture will perish. Not only individual maladjustment and group tensions, but international annihilation will be the price we pay for a lack of creativity. (p. 72)

One of the new dimensions of learning to receive marked attention since the early 1950's is that of recognizing, nurturing and developing the creative ability of students. Although the development of creative ability is now regarded as an educational goal, educational practice continues to emphasize the absorptive and retentive qualities and to neglect the systematic development of the imagination.

Harding (1962), in a lecture presented at the Creative Problem Institute in 1958, made the following statement:

We are not now giving creativity the attention it deserves in our curricula . . . . The plain fact is that there is a crying need for creativity to be taught in every classroom . . . . Where it is now taught, it is by accident and chance, rather than by design and understanding. (p. 4)

Teachers are reluctant to become involved in an area in which they themselves feel inadequate. Before they can be expected to add some-



thing more to a presently overloaded school program, especially something as indefinite as the development of creativity ability, more research and experimental projects should be conducted in the classroom with teacher participation. This study was designed to investigate some of the theories advanced by research about students with creative ability.

### Creativity, Intelligence, and Achievement

The physical and psychological restrictions in the schools have caused students to become conforming, stereotyped individuals instead of original thinkers. Guilford (1962), in his address to the American Psychological Association, made this statement: "The most common complaint I have concerning our college graduates is that while they can do assigned tasks with a show of mastery of the techniques they have learned, they are much too helpless when called upon to solve a problem where new paths are demanded." (p. 45) The same can be said of our high school students except that their creative ability has not been buried under so many layers of educational concrete.

One of the reasons that the high schools have continued to emphasize academic achievement is that many universities and colleges continue to select students according to their intelligence assessment or achievement scores. Sarason (1962) quotes MacKinnon as having said in connection with university scholarships:

There is increasing reason to believe that in selecting students for special training of their talent we may have overweighted the role of intelligence either by setting the cutting point for selection on the intellectual dimensions too high or by assuming that regardless of other factors the student with the high IQ is the more promising one and should consequently be chosen. (p. 484)

MacKinnon (1966) suggests further that whether a person performs creative-





ly or banally can be determined by non-intellective traits which are associated with creative talent.

Traditional measures of intelligence are primarily tests of convergent thinking dependent on recall of absorbed information. These tests and standardized objective tests in the subject areas almost totally exclude divergent thinking ability. Guilford (1959) points out that the intellectual structure of any individual has abilities in addition to those measured by IQ tests, among them the factors of creative thinking. Getzels and Jackson (1962) maintained from their studies that creativity and intelligence were relatively independent factors. The factor analyses carried out by Thorndike (1963) and Taylor (1962) failed to yield separate creative factors independent of IQ. The many studies reviewed by Parnes and Brunelle (1967) indicated a low positive correlation between IQ and creativity, especially at the high levels of IQ. (See Chapter II). Furthermore, studies by Getzels and Jackson (1959) and Torrance (1965) (Chapter II) suggested that IQ measures and creativity tests were about equal predictors of academic success. Yamamoto (1964) reported that there was no significant difference in achievement between highly creative and highly intelligent groups of college freshmen.

Buhl (1955) attempted to compare the highly creative engineering students with the less creative ones. He found a close correlation between creativity and scholastic achievement at the end of the freshman year, but a low correlation between creativity and IQ. He pointed out that a high mental potential does not insure high creative ability but that a person with a high mental potential has a greater opportunity to exercise his creative ability.

Many educators and psychologists of the past decade became in-



creasingly aware of the limitations of IQ tests and of the importance of recognizing and developing other intellectual abilities such as creative thinking. Taylor (1962) summarized their opinions in the following statement:

The development of fully functioning individuals has been an avowed objective of education. We believe that education in a democracy should help all individuals develop their talents fully to become as nearly self-actualized as possible. To fully develop the intellectual capacities of our children and to lead them closer to self-actualization, the abilities involved in developing creativity and creative thinking cannot be ignored. The traditional measures of intelligence assess only a few of man's intellectual talents . . . Man's complex operations are not being fully developed or assessed. Among them is his ability to think and act creatively. (p. 174)

A related part of the present study was to examine more closely the relationship between IQ, creative ability, and achievement within high school students to determine whether the correlations would be similar to the foregoing studies.

### Creativity and Its Development

Creativity has been defined in terms of a process, a product, and a person. To measure and evaluate creativity the product must be considered, whether it be a recognized creative achievement or the work produced on a creativity test. To develop creativity, the process is more important to the educator than the product. Kneller (1965), Torrance (1962), and Guilford (1959) agreed that productivity was not a necessary attribute of a potentially creative person. They also agreed that creativity, an intellectual property shared by all to a greater or lesser degree, could be fostered under stimulating and sympathetic environmental conditions.

The production of something new has been included in most defini-





tions, but Thurstone (1938) maintained that an act or idea (artistic, mechanical, or theoretical) was creative if the thinker reached the solution by insight or inspiration even though the idea may have been produced earlier by someone else. Torrance (1962) added that creativity was a successful step into the unknown, getting away from the main track; breaking out of the mold; being open to experience, and permitting one thing to lead to another; and recombining ideas to see new relationships.

There are a number of creative abilities varying in strength in each individual and these abilities may be suppressed to extinction or developed to their fullest potential. It is unlikely that in a system of education which processes the multitudes that there can be significant gain in creative thinking. When the emphasis is on the acquisition of knowledge, the student becomes mark-oriented; when accuracy is increasingly required, the student becomes less original. Kneller (1965) and Torrance (1965) pointed to the slavish adherence to the credit system and textbooks, the lecture method, the traditional classroom seating arrangements, and the authoritarian teacher as further obstacles to the development of creative ability. However, in this study an attempt was made to give evidence that under certain environmental conditions in the classroom with particular kinds of practice, creativity could be increased.

### Personality and Creative Ability

Considerable research has been conducted in the investigation of the background, environmental influences, and personality traits of creative people.

A distinction must be made between persons who are uniquely creative



--those rare individuals, the Einsteins, Picassos, and Mozarts, who have contributed creative achievements of great value to society--and those who possess average or less creative potential. The oldest conception of creativity regarded it as divine inspiration--a view that persists today. Creative power was also considered a form of madness--even in the twentieth century, creative people are considered "queer" bordering on insane. During the eighteenth century, creative ability was considered "intuitive genius" in rare and strange persons. (Kneller, 1965).

Barron (1963), Drevdahl and Cattell (1958), and MacKinnon (1960) have suggested from their research that people who are productively creative in their field are often rebellious, ego-centered, withdrawn, and nonconforming in their interpersonal relationships. Viktor Lowenfeld (1962) states that creative people have exhibited erratic and disorderly behaviour because they were frustrated by society, not because they were innately queer. Toynbee (1964) stated the following warning:

To give a fair chance to potential creativity is a matter of life and death for any society. This is all-important, because the outstanding creative ability of a fairly small percentage of the population is mankind's ultimate capital asset and the only one with which man has been endowed. (p. 4)

The writer agrees that the creative genius should be recognized and encouraged to pursue his special talent, but he is not the main concern of the educator. The objective of education is to help each student realize his fullest potential. Developing even the most limited creative potential is important to the individual.

Creative abilities differ between individuals and vary in degree within each individual as do those abilities measured by traditional IQ tests. To preserve our society, these differences in creative ability must be considered by educators. Kneller (1965) suggested that:



"Much of the disorder of contemporary youth is an explosion of potential creative energy that can find no outlet. School regulations are designed to keep masses of young people in order by making them behave in unison." (p. 99) Toynbee (1964) stated that:

In a child, ability can be discouraged easily; for the children are even more sensitive to hostile opinion than adults are, and are even readier to purchase, at any price, the toleration that is an egalitarian minded society's alluring award for poor-spirited conformity. The price, however, is likely to be a prohibitively high one, not only for the frustrated individual himself but for his stepmotherly society. Society will have put itself in danger, not just of throwing away a precious asset, but of saddling itself with a formidable liability. When creative ability is thwarted, it will not be extinguished; it is more likely to be given an antisocial turn. (p. 6)

If the development of creative ability can assist young people to become successful in their vocations or help them to use their leisure time profitably, educators cannot neglect this area of training. Every student should have the opportunity to enjoy some area of creative activity.

Don Bell, in Maclean's Magazine (1968), reported the success that the Creative Awards Association has had in promoting creative activities for the prisoners at the Leclerc Penitentiary near Montreal. He stated that "many inmates have experienced a growth of self-esteem to the point of making crime as a way of life unthinkable". More than twelve men have been helped; those who have since been released have continued with the activity of writing or painting or whatever they chose. Bell also quoted Boyer of McGill University as having said: "It's not a question of rehabilitating prisoners. Rather, it's a question of HABILITATING them. Many simply never had a chance in the first place."

The writer is concerned, not with the creative genius, but with "giving a chance" to the high school student who possesses some measure of creative ability. It is important for educators to know whether





students who indicate a high creative potential on creativity tests exhibit personality traits different from those who score lower on the tests or similar to those which researchers have discovered in uniquely creative persons. The general purpose of this study was to investigate the personality traits, background, family living experiences, and creative activities of students who scored high on creative tests as compared with those who scored low on the tests.

### Purpose of the Study

Theorists and research people have indicated a strong interest in the area of creativity. When this study was designed there was no report to be found by the writer of a study of the creative ability of high school students in Alberta.

The general purpose of the study was to provide information about the students who measured high on creativity tests as compared with those who measured low on the creativity tests. The study was conducted to determine personality traits, background, family living experiences, self-evaluation, and creative activities of the students in the high, low and average groups as measured by the creativity tests. Such information may aid teachers in recognizing students with creative potential. A secondary but related purpose was to investigate the possibility that when students were exposed to teaching designed to increase creative ability, there would be a gain on subsequent tests of creativity. A further purpose was to determine whether or not there was a significant correlation between creative ability, intelligence and achievement in English at the high school level.





## Definition of Terms

### 1. Intelligence

Intelligence is innate intellectual ability influenced by environment and training. The Intelligence Quotient (IQ) is a psychomathematical concept used to assess human abilities which are related to cognitive processes. IQ is a measure of general reasoning, vocabulary ability, number ability, memory for ideas, ability to visualize spatially, and perhaps perceptual speed. Taylor (1962) stated that intelligence is usually regarded as academic ability.

The IQ scores for this study were derived from the Lorge-Thorndike Intelligence Test (verbal and non-verbal) which was administered under the supervision of the school counsellors as part of the school testing program.

### 2. Creativity

Creativity is a complex group of abilities which, when observed, indicates the ability of an individual to think and act in ways which are unique or original for that individual. Creative thinking involves divergent thinking -- exploring a variety of solutions in different directions to solve problems. The concept of creativity as used by the researcher involved consideration of those intellectual operations labelled by Guilford (1956) as divergent thinking. These factors are basically different from those measured by intelligence tests. Guilford (1956) has identified sixty of these factors as part of the entire structure of intellect.

In this study "creativity" or "creative ability" was measured by the Minnesota Tests of Creative Thinking. Six intellectual factors of



divergent thinking were assessed -- expressional fluency, ideational fluency, verbal and non-verbal flexibility, and verbal and non-verbal elaboration. The creative ability score in this present study was the total unweighted sum of the sub-scores of flexibility, fluency, and elaboration on the verbal and non-verbal tasks. The following definitions of these subscores are those of Guilford listed by Kneller (1965, p. 45-47).

#### A. Verbal Fluency

Verbal fluency or ideational fluency is the ability to call up many ideas in a situation relatively free from restrictions. It involves the speed with which original ideas are expressed.

#### B. Non-verbal Fluency

Non-verbal fluency is expressional fluency which is the ability to give up one perceived organization of lines in order to see another.

#### C. Verbal Flexibility

Verbal Flexibility is the ability to produce a diversity of ideas. It is scored by counting the number of classes or categories suggested. It reveals the ability to shift and to adapt and to deal with the new, the unexplored, and the unforeseen.

#### D. Non-verbal Flexibility

Non-verbal flexibility is the ability to produce a diverse number of ideas in line drawings. It reveals the ability to shift from one area to another.



## E. Verbal Elaboration

Verbal Elaboration is the ability or disposition to supply details to complete a given written form. It is the process of association whereby one item of information comes to imply another and produces chain-like thinking. The elaboration score suggests that novel ideas of the person are "followed up" and could result in creative achievement.

## F. Non-verbal Elaboration

Non-verbal elaboration is the ability to supply details to complete a pictorial form.

## 5. Creative Activities

Creative activities are those activities in which a person invents, thinks, or creates something that is new to him. It may be a redefinition, a rediscovery, or a revision of something that is original for the individual.

For the purpose of this study "creative activities" included participation in performing or visual arts: writing, drama, art, photography, crafts, sculpture, music, dance. The activities also included these: recreation, culinary arts, investigation of problems in science or social studies, and adventuresome activities. These activities were part of the Personality Inventory constructed by the researchers. (See Appendix B).

### LIMITATIONS OF THE STUDY

The major limitations of the study were as follows:

1. The research was limited to samples drawn from grade eleven students in one high school.





2. The group was not compared with a control group established precisely for purposes of the study.
3. The creativity tests were limited to two tasks.
4. The use of creativity as an independent variable was a limitation because of the low reliability-validity of the creativity tests.

### Organization of the Study

The introduction to the problem, the purpose of the study, the definition of the terms, and the limitations of the study are to be found in Chapter I. Chapter II reviews related literature and research, and contains a statement on the contribution of the present study. The design of the study, including descriptions of the subjects used, the instruments, the sampling procedures, and the method of treating the data, is presented in Chapter III. The results have been presented in Chapter IV. Chapter V includes a summary of the findings, conclusions, and recommendations.



## CHAPTER II

### REVIEW OF RELATED LITERATURE

#### Introduction

A survey of the literature relating to the study of highly creative students and the relationship of creative ability to intelligence and achievement will provide a frame of reference for the study.

There has been a great upsurge of interest among educators and social scientists in the area of creativity since 1950. Parnes and Brunelle (1967) reported that between 1951 and 1957 about ten research projects per year were reported on creativity in the Psychological Abstracts. The number doubled in 1958, and since 1960 about forty per year were reviewed. In the last year and one-half about two hundred dissertations were recorded in a variety of disciplines. New periodicals such as the Journal of Creative Behaviour have published research findings, experiments, and articles by the experts in the field of creativity. Recently, Torrance (1962, 1965), Guilford (1962), Getzels and Jackson (1962), Barron (1965), and Osborn (1962) have written extensively on a variety of subjects in the area of creativity.

Much of the theory is of interest to educators and psychologists and a great deal of the information is challenging to innovators of curriculum change. Most of the analyses of behavioural patterns describe the creative adult, including significant influences in their childhood and youth. Several of the studies which have analyzed children and students have also compared intelligence, creativity, and achievement. The experiments which have endeavoured to increase crea-



tive ability have been done primarily in the elementary school or in institutes and workshops for adults.

## RELATED LITERATURE AND STUDIES

### Intelligence, Creativity, and Achievement

The study of man's intellectual abilities and the relationship of this ability to man's achievement has been and continues to be an important area for scientific research. Psychologists have attempted to measure the intelligence quota of individuals in order to predict the level of academic performance which could be expected of them. Many intelligence tests have been devised and many of these tests have been of great assistance to educators. However, it has been acknowledged that IQ scores are not the only predictors of academic success.

Kneller, in The Art and Science of Creativity (1965), quoted Paul A. Witty as having said: "The very fact that some high IQ's do poorly in school and some lower IQ students do well indicates that intelligence, as conventionally measured is not the only criteria for predicting educational success. Intelligence tests rarely account for more than a quarter of the variance in such crucial factors as school achievement and academic performance." (p. 26) However traditional IQ tests were not intended to be measures of the total factors of intelligence. C. C. Miles (1960), at the Minnesota Conference on the "Gifted Child," pointed out that Terman, in speaking about his intelligence tests, challenged educators and psychologists to continue the work, "to produce other concepts as effective as the IQ for the delimiting of a group of talents to include the most successful students, the best achievers in the academic world and in the world of human relations and





human endeavor generally." (p. 7)

Guilford, in his analysis of the structure of intellect, devised tests to examine intellectual faculties other than those which were measured by traditional IQ tests. He considered creative ability as only one of the many facets of intellect which should be considered. Guilford (1959) made the following statement:

The abilities called "creative" fit logically into the general context of intellectual abilities, regardless of the kind of creative output. Creative aptitudes compose a segment of intelligence, but of a much broader conception of intelligence than is usually held. It is a badly neglected segment, for the creative abilities have been almost entirely overlooked in customary tests of intelligence. IQ tests by origin and by subsequent emphasis, have stressed a very few intellectual abilities that are obviously important for success in school, and success in school has been assessed in a way that emphasizes the same basic abilities. The "intelligence" of which most writers speak is actually more properly regarded as academic ability. Neither academic-aptitude tests nor academic-achievement measures have given any weight to creative performances, except in very rare instances. (p. 42)

Having taken strong exception to the use of IQ as the sole measure of "giftedness," Getzels and Jackson (1962) conducted extensive investigations to find abilities other than intelligence which could contribute to the identification of "giftedness." They concluded that creativity was another ability relatively independent of intelligence. Their studies of the highly creative and the highly intelligent also indicated that despite a difference of twenty-three points between the mean IQ's of the two groups they were equally superior in school achievement compared to the student population as a whole.

In his reinterpretation of the data of the Getzels and Jackson study, Barron (1965) pointed out that the mean IQ of the students, registered in grades six through twelve in the private urban school was 132 as determined by the Stanford-Binet, Henmon-Nelson tests. Thus the





average student in the study was in the upper one per cent of the general population. The correlation of the scores of the creativity measure as determined by the Word Association test and the IQ scores was .32. Subsequent studies have indicated a closer correlation between IQ and creative ability when lower levels of IQ were included. Getzels and Jackson probably found a low correlation between IQ and creativity because they used students in a limited (high) IQ range. MacKinnon (1960), Taylor (1962) and Torrance (1962) found a low positive correlation between creative ability and intelligence among elementary and secondary students, implying that there was a degree of relationship between creativity and intelligence, thus supporting the Getzels and Jackson findings, but not to the same degree because they used a sample with a greater range of IQ.

Torrance (1962) concluded that children who scored low or average on IQ tests tended to have low or average creative ability, but that a high IQ did not insure high creativity. He found that the highly creative children had an IQ score of at least 120, and belonged, therefore, to the upper tenth in intelligence. He agreed with Getzels and Jackson that if the top 20 per cent in IQ were selected as gifted about 70 per cent of the highly creative would be eliminated.

McNemar (1964) also indicated that in many studies the low correlations between the scores of IQ and creativity were due to the restricted range of ability in the samples. He suggested that at high IQ levels there is a wide range of creative ability but for lower IQ levels the scatter becomes less diverse.

Medneck and Andrews (1967), in their report on the relationship between creative thinking as measured by the Remote Associate Test and IQ as determined by the Lorge-Thorndike tests, found a correlation of



.43 for high school students and .34 for college freshmen. Their study suggested that among college students intelligence was moderately related to creative ability and that there was no differential decline in this relationship as intelligence scores increased. They suggested that since their study did not show that creativity and intelligence were relatively independent processes among the very bright and more closely related at upper levels that, "It would be worthwhile to examine this relationship in data from a population with a wider range of IQ; eg. A typical high school." (p. 16)

According to these studies some of the factors of creative ability are predictive of academic success as are factors of IQ, indicating that the cognitive abilities of creativity are not independent of intelligence. In all of the studies it is apparent that individuals who scored above average on creativity tests also scored above average on IQ tests. Above the critical level of approximately 120 IQ creative ability and intelligence have insignificant relationships; therefore, at this level creative ability should be considered an important part of the intellectual structure and should be used in the identification of "gifted" students.

### Creativity and Its Development

It is now a well-known fact that nearly all of us can become more creative, if we will. And this very fact may well be the hope of the world. By becoming more creative we can lead brighter lives and can live better with each other. By becoming more creative we can provide better goods and services to each other, to the result of a higher and higher standard of living.

--Osborn (1962, p. 7)

Alex Osborn, believing that creative ability could be increased through education, devised methods of instruction to strengthen crea-





tive thinking and creative-problem solving. He and his colleagues initiated workshops, seminars, and conferences for the development of creative ability. The results of this work aroused great interest and many experiments and projects were conducted for the enhancement of creative ability.

Parnes and Brunelle (1967), have reviewed many extensive and successful projects which were financed by science, business, government, and industry in an endeavor to find and develop creative thinkers and creative problem-solvers. General Motors, Ford Company, International Business Machines, the Canadian National Railway, National Education Association, and the American Armed Services are examples of organizations which have included creative-thinking courses in their training programs. Parnes and Brunelle (1967) have reported experiments in creativity conducted at the college level and Torrance (1962), Smeltzer (1966), Kogan and Morgan (1967) have reported research done in the elementary school. Comparatively little has been done in the classroom at the high school level to develop creative ability.

Reyburn (1963) found that when teachers were trained to use techniques and methods to develop divergent and creative thinking with fifth grade students, their creativity scores were significantly affected. Smeltzer (1966) also found that fifth grade students, who were taught by teachers who scored high in tests of flexibility, increased their own flexibility scores significantly more than did students who were exposed to inflexible teachers.

In Hutchinson's study of Creative and Productive Thinking in the Classroom" (1967), it was found that although there was a low positive correlation between mental age and creativity, there were many students of high mental ability who did not produce creatively, and that many





students who produced creatively did not have high mental ability. He found a similar pattern for productive thinking. He concluded that students who measured high on creativity tests did not have much opportunity to use their creative potential in the typical traditional classroom. In his experiment, when students who were creative were allowed to use the inquiry method and to interpret findings for themselves as well as absorb knowledge they gained as much in subject-knowledge as did students with high mental ability. He concluded that in a traditional classroom, which was teacher-centered, when student's divergent and productive responses were limited, his learning was also limited. He did not retest for gain in creative thinking, but his study indicated a lack of awareness among teachers about the development of students with high creative potential. The Smeltzer (1966), and Hutchinson (1967) studies emphasized the role of the teacher in the development of creative ability as did the work of Torrance (1962), and Getzels and Jackson (1959).

In all of the studies which indicated a gain in creative ability, Smeltzer (1966), Osborn (1962), Parnes (1967), the gain in creativity was actually a gain in the cognitive factors which were tested before and after treatment. There are no long term studies which measure the success of students or adults who have increased their creative potential by training. The possibilities for teaching for originality are limited. However, as Rogers (1954) pointed out, the innate potential factors of creativity in students can be facilitated by providing opportunities for self-initiated learning, independent study, deductive reasoning, intuitive thinking, and individualized interpretation. On the other hand, creative potential can also be inhibited by unfortunate environmental circumstances, restricted situations, lack of recognition for unusual ideas, unawareness of personal strengths, and psychological



barriers.

### Creativity and Personality

Many studies dealing with biographical data and personality structure of creative people have been reported. One of the first studies in this area was that of Getzels and Jackson (1959). They found that the highly creative students in grade seven through twelve had a wider range of interests, greater emotional stability, and a keener sense of humor than did the highly intelligent. They had aspirations towards unconventional occupations, such as, adventurers, writers, and inventors. The parents of creative children seemed to be less vigilant over their children and less critical of both the children and the schools than were parents of highly intelligent children. The parents of the creative children focused their attention on the child's openness to experience, his values, his interests and his enthusiasm, whereas the parents of the highly intelligent focused their attention on the child's academic progress, his manners, and his seriousness.

Drevdahl and Cattell (1958) found that highly creative persons were more individualistic, dominant, introverted, non-conforming, ambitious, achievement-oriented, and self-disciplined than the average person. Bloom (1956) also found significant differences in the personality traits of individuals who rated high creatively and those who rated low. He found the "high creative" to be withdrawn socially, preferring environments in which ideas were emphasized as opposed to environments emphasizing social relationships.

Three physicians, Graves, Ingersoll and Evans (1967), in their study of creative medical students reported that the medical students who rated high creatively more frequently came from broken homes, and for recrea-



tion preferred movies, modern music, and creative hobbies. They evaluated themselves as above average in oral expression, organizing facts, originating new ideas, and seeing relationships. These creative medical students saw the future as a challenge and expressed preference for future careers in basic science, medical specialities, research, and academic medicine. The researchers stressed the importance of early identification of creative students in order to provide educational environments suitable for their development because the creative medical students, admitting low motivation for learning under the existing conditions, indicated the possibility of not completing their training.

Barron (1967), in a study of 100 United States Air Force captains, found that originality was related positively to independence of judgement, personal complexity, preference for complexity in phenomena, assertion and dominance, and rejection of suppression as a mechanism for the control of impulse.

Kneller (1965) suggested that creative individuals can be recognized as being emotionally and aesthetically sensitive to their environment, verbally and artistically fluent, sceptical of accepted ideas, persistent, self-confident, and independent.

MacKinnon (1966) stated that in his study of creative architects, the architects claimed that their independence of spirit caused them to chafe under classroom discipline and classroom routines. MacKinnon suggested that the problem was caused by the high level of energy which creative people have and which they prefer to channel into self-initiated activities and independent work. MacKinnon also discovered the following factors in the background of creative architects: a lack of closeness between parents and child and a lack of physical punishment in childhood; frequent moving of the family and the freedom to wander and explore;







and father in engineering or business.

In the studies of Torrance (1962) and Hammer (1964), the teachers indicated a preference for the highly intelligent rather than the highly creative student. It was suggested by Torrance (1962) that qualities such as independence, self-confidence, and venturesomeness in creative children, which often caused adults much distress, were those qualities which were important to them in the world of work.

Most of the studies about the creative individuals indicate that he has a wide range of interests and activities. He may be introverted and independent in his judgements but he is also dominant and evaluates himself as being above-average in many things. He is achievement-oriented and sees the future as a great challenge. Because he sometimes exhibits anti-social characteristics he is not as popular with his teachers as are the students of above-average IQ. Many creative individuals have come from broken homes or indicate a lack of closeness with parents. Creative adults have admitted to frustrating experiences in school and creative college students have indicated an intolerance of restricted educational methods.

One of the reasons for the early identification of creative students is not only to guide, encourage, and stimulate them, but also to understand that creative energy sometimes causes them to exhibit behaviour which is bothersome to adults. All of the investigators agree that research should be continued in order to better understand the student who is gifted with above-average creative ability.

#### Contributions of This Study

The literature on creative ability indicates that government, business, and industry regard creative ability as an intellectual capacity



important enough to spend huge amounts of money in research on it and to conduct institutes to develop and utilize this ability in individuals who are identified as creative thinkers. Although educators are also aware of the value of creative thinking and creative problem-solving, there is a lack of evidence that school curricula and classroom procedures have been influenced by this knowledge. Torrance (1962), and Guilford (1959) have suggested that information available about creativity should be applied in the classroom and further research should be conducted at the classroom level.

This study provides information which has not been previously available concerning creative ability in the high school. At present there is no information on the relationship between scores on achievement, intelligence, and creative ability of high school students in Alberta. The growing interest in creativity combined with the need to know more about the background, personality traits, and behavioural patterns of high school students of high creative ability justified the decision to undertake this research. The study provides one more segment of information on creative ability of high school students.



## CHAPTER III

### THE DESIGN OF THE STUDY

#### Introduction

This study was designed to provide information both on behavioural patterns of high school students which might be associated with creative ability and on the possibility that creativity scores might be increased under certain environmental conditions. A secondary aspect was the relationship of intelligence, creativity, and achievement in English. The study was conducted during the school term in 1967-68. At that time no exploratory studies on creative ability of high school students had been published in Alberta. It was hoped that the results might be helpful to teachers who were interested in recognizing and nurturing creative ability in students.

#### Selection of Sample

The school selected for the study was a high school having a total population of 850 students in a northern city with a population of 400,000 in the Province of Alberta, Canada. The sample consisted of the 248 students who were enrolled in the eleventh grade of a senior public high school in November, 1967. Because some of the students were absent from one or more of the testing sessions the effective sample size was reduced to 227 (96 males and 131 females). The sample mean age was 16.4 years and the total age range was 15 years to 19 years.

The sample of 227 students was divided into X and Y groups. Group X, consisting of 67 students, was taught by a teacher who involved them in several experimental projects during regular class time. They were





exposed to some of the techniques developed by Torrance (1962), and methods used at the Creative Institute in Buffalo, New York as described by Osborn (1962). The students participated in brain-storming sessions, panel discussions, and symposiums. Film strips, tape recordings, records, and films were used extensively to stimulate creative thinking. The students were given many opportunities to do creative thinking individually, in small groups, and in large groups. During the year a series of lessons on screen education was included. This screen education program was made possible by special arrangement with the National Film Board of Canada. These students attended regular classes in all other subjects. The Y group, consisting of 160 students, was the non-experimental group. They were the remaining grade eleven students. This was not a control group. They did not participate in any of the activities of the experimental group.

In November, the students wrote the Creativity Pre-Test, on the basis of which they were divided into high, middle, and low groups. The "high group" or the "highly creative" students refers to those students, who, in their own school and own grade, belonged to the top 20 per cent on creative thinking ability scores. The "low group" refers to the "low creative" students identified as those who in their own school and own grade belonged to the bottom 20 per cent in creative thinking ability scores. The "middle group" referred to these students who belonged to the 60 per cent between the high and the low groups.

### Instruments

#### Measures of Intelligence

1. Verbal IQ - Scores obtained from the Lorge-Thorndike Intelligence Test



2. Non-verbal IQ - Scores obtained from the Lorge-Thorndike Intelligence Test
3. IQ - Sums of the verbal and non-verbal Lorge-Thorndike Intelligence Test

The Lorge-Thorndike Test gives deviation IQ's with a mean of 100 and a standard deviation of 16. The intelligence scores which were available from the school records had been administered in the 1967 spring term.

### Measures of Achievement

1. Reading - Scores obtained from the Sequential Tests of Educational Progress in Reading, Level 2, Form A. The description of the Sequential Tests of Educational Progress for the Reading Test is described in the Manual as follows:

Measures ability to understand direct statements, to interpret and summarize passages, to see motives of authors, to observe organization of ideas, and to criticize passages with respect to ideas and purpose of presentation. Passages were selected to represent the major types of material which students are called upon to read: directions and announcements, articles of information or explanation, letters, stories, poetry, articles of opinion or interpretation and plays. (p. 4)

2. Writing - Scores obtained from the Sequential Tests of Educational Progress in Writing, Level 2, Form A. The description of the Sequential Tests of Educational Progress for the Writing Test is described in the Manual as follows.

Measures ability to think critically in writing, to organize materials, to write material appropriate for a given purpose, to write effectively, and to observe conventional usage in punctuation and grammar. Materials were selected from actual student writing in letters, answers to test questions, newspaper writing, announcements, essays, reports, records, minutes, logs, stories, notes, outlines, answers to questionnaires and directions. (p. 5)

These measures of achievement used objective questions. The achievement measures, which were available from the school records, had been administered in the fall term, 1967.

### Measures of Creativity



Two forms of the verbal and non-verbal measures of the Minnesota Creativity Tests were used. Form A was administered six months prior to Form B. The measures were based on the definitions of creativity given in Chapter II.

The two measures employed in the pre-test were the following:

1. Circle Test - Non-verbal
2. Unusual Uses of Tin Cans - Verbal

Both measures yielded scores representing fluency, flexibility and elaboration of ideas. Six separate variables were available for statistical treatment on the pre-test.

Form B similarly consisted of two measures:

1. Triangles - Verbal
2. Unusual Uses - Non-verbal

Form B provided scores for fluency, flexibility, and elaboration of ideas, thus making available six more variables.

### Reliability of Creative Measures

The Minnesota Tests of Creative Thinking, developed by Paul Torrance, were used by him and his associates for assessing creative thinking abilities of individuals from kindergarten through graduate school. Torrance (1965, p. 272) reported the Yamamoto and Mackler's test-retest reliability results. For the Unusual Uses Test (three testings, each two weeks apart) Mackler obtained reliabilities of .61 and .62 for fluency and flexibility, between the first and second testings; .75 and .74 between the second and third testings; and .65 and .71 between the first and the third testings. Yamamoto obtained reliabilities of .75 and .60 for Unusual Uses. For the Circles Test, Mackler obtained reliabilities of .72 and .60 for fluency and flexibility be-





tween the first and second testing, .47 and .60 between the second and third testings; and .65 and .62 between the first and third testings.

The two scorers in the present study marked the tests according to the principles established by Yamamoto (1962). (Appendix A) The scorers consulted each other about all unusual answers making notation of discussion so that similar answers would be scored the same way.

### Personality Inventory

The personality inventory was designed by the researcher. The students were asked to express their personal opinions in the questionnaire. This inventory was administered by the head of the English Department of the school. The instructions which were given precede the inventory itself in Appendix B. The Personality Inventory attempted to find information in the following areas:

1. Background in the following: father's occupation, number of schools attended, and number of cities of residence.
2. Range of interests in the following:
  - a. Creative activities: drama, sculpture, crafts, creative writing, photography, games and recreation.
  - b. General preferences: food, music, gifts, pets, collections, and camping sites.
3. Self-Evaluation in the following: written expression, oral expression, memory, creative ability, sociability.
4. Attitudes towards the following: report cards, rewards, methods for studying, methods for creative thinking, subject areas, teachers, parents and friends.
5. Independence in the following: financial, parental control, and occupational choice.
6. Ability to assume responsibility.

### Treatment of Data

### Creativity and Intelligence



Pearson product-moment correlations were calculated between the verbal, non-verbal, and total IQ; and verbal, non-verbal, and total creativity pre-test, and post-test scores, for the high creative group, males, females, and total; low creative group, males, females, and total; total males, total females, and total population.

#### Creativity, Intelligence, and Achievement

Pearson product-moment correlations were calculated for the verbal, non-verbal, and total IQ scores, and verbal, non-verbal, and total creativity pre-test and post-test scores with the achievement scores on the standardized Reading STEP test and the achievement scores on the standardized Writing STEP test, for the following: high creative group, males, females, and total; low creative group, males, females, and total; total males, total females, and total population; Group X and Group Y.

#### Difference Between X and Y Group Mean Creativity Scores

The significance of the difference between the mean post-test creativity scores of groups X and Y was tested by carrying out a one-way analysis of covariance in which the pre-test creativity scores were used as the covariate. (See Appendix F).

#### Creativity and Behavioural Patterns

A one-way Kolmogorov-Smirnoff was applied to the choices of the subjects on each of the items of the Personality Inventory to compare the actual distribution of the choices with a theoretical rectangular distribution.

A Chi Square test was applied to the choices of the students of the



highly creative group and the low creative group to test for significant differences in the choices.





## CHAPTER IV

### REPORT OF FINDINGS

The purpose of this chapter is to report and interpret the analysis of the data.

The primary goal was to investigate the behavioural patterns of students who scored high on measures of creativity as compared to students who scored low or average on measures of creativity. As background to this major objective and for the organization of groups the following information was determined, the correlation of intelligence scores with creativity scores of students who scored high on measures of creativity as compared with students who scored low or average on tests of creativity; the correlation of intelligence scores and creativity scores with achievement on standardized reading and language tests. For further information on the characteristics of creative students the correlation of the six factors of the creativity tests were analyzed.

A secondary purpose of the study was to examine the contrast between mean scores obtained by the experimental group (Group X) and the non-experimental group (Group Y) on the pre-test and post-test creativity measures. The findings reported in this chapter resulted from an analysis of data secured, as described in Chapter III, from 227 grade eleven students in a city high school. The background data will be presented first.

#### Intelligence and Creative Ability

The battery of creativity tests which was administered in the month of November to the students in the sample was scored and used for the division of the groups. The high group consisted of those students whose



total scores in the creativity pre-test were in the top 20 percent. The total number in the group was 46, of these 14 were males and 32 were females. The low group consisted of those students whose total scores on the creativity pre-test were in the bottom 21 percent. The total number was 48, of these 28 were males and 20 were females. The middle group consisted of those students whose scores in the creativity pre-test were in the middle 59 percent. There were 79 females and 54 males totalling 133 in this middle group. The means for the IQ scores and creativity tests for these three groups are given below.

IQ scores and standardized reading and language scores were acquired from the school records. The mean and standard deviation were determined for the verbal IQ test (VIQ), the non-verbal IQ test (NVIQ), the total IQ test (IQ), the verbal creativity pre-test (PVC), the non-verbal creativity pre-test (PNVC), the total creativity pre-test (PC), the reading test (R) and the language or writing test (W). A second battery of creativity tests, which was administered six months later, was also scored and recorded. The mean and standard deviation were also recorded for the verbal creativity post-test (PTVC), non-verbal creativity post-test (PTNVC), and the total creativity post-test (PTNVC). The mean and standard deviation for all of the tests were tabulated for the males, females and total number of the high, low and middle creativity groups (Tables 1, 2, and 3).

The raw scores of the creativity pre-test were arranged in rank order and a high, low, and middle trichotomy was established. (See Appendix C). The high group representing the top 20 percent of the entire sample consisted of 46 individuals, 14 males and 32 females. For this group, the mean and standard deviation for the creativity pre-test was 77.93 and 9.59; for the verbal IQ, 121.84 and 12.41; and for the



non-verbal IQ the mean was 121.93 with a standard deviation of 11.59. (Table 1).

The second sub-sample, which consisted of 28 males and 20 females totalling 48 individuals, represented the bottom 21 percent of the sample in terms of the total creativity scores. The mean creativity score for this group was 32.33 and the standard deviation was 4.80. The mean verbal IQ of this group was 117.14 with a standard deviation of 11.35 and the mean non-verbal IQ was 116.02 with a standard deviation of 12.39 (Table 2).

The third sub-sample which consisted of 133 individuals (54 males and 79 females), represented the average 59 percent of the total population. The mean of the creativity score for this group was 51.22 with a standard deviation of 7.20, the mean verbal IQ was 120.33 with the standard deviation of 12.19, and the mean non-verbal IQ was 119.07 with a standard deviation of 12.61 (Table 3).





TABLE I  
MEANS AND STANDARD DEVIATIONS OF HIGH GROUP<sup>1</sup>

	MALE (N=14)		FEMALE (N=32)		TOTAL (N=46)	
	MEANS	SD	MEANS	SD	MEANS	SD
PVC	29.00	8.90	28.53	9.21	28.67	9.13
PNVC	49.92	7.27	48.96	10.88	49.26	9.93
PC	78.92	8.54	77.50	9.98	77.93	9.59
PTVC	29.57	10.53	34.75	11.45	27.58	11.43
PTNVC	32.85	10.04	35.09	12.44	34.41	11.81
PTC	64.42	19.38	69.84	18.11	67.58	18.83
VIQ	123.00	11.75	121.34	12.66	121.84	12.41
NVIQ	127.21	10.56	119.59	11.26	121.93	11.59
IQ	250.21	19.87	240.93	20.08	243.76	20.46

<sup>1</sup> HIGH GROUP - Students whose scores in the creativity pre-test total were in the top 20%.

#### CODE FOR THE VARIABLES

VIQ - verbal IQ  
 NVIQ - non-verbal IQ  
 IQ - total IQ  
 PVC - verbal creativity pre-test  
 PNVC - non-verbal creativity pre-test  
 PC - total creativity pre-test  
 PTVC - verbal creativity post-test  
 PTNVC - non-verbal creativity post-test  
 PTC - total creativity post-test



TABLE 2  
MEANS AND STANDARD DEVIATIONS OF MIDDLE GROUP<sup>1</sup>

	MALE (N=54)		FEMALE (N=79)		TOTAL (N=133)	
	MEANS	SD	MEANS	SD	MEANS	SD
VIQ	120.92	10.46	119.92	13.23	120.33	12.19
NVIQ	120.87	13.35	117.84	111.92	119.07	12.61
IQ	241.79	20.90	237.77	21.99	239.41	21.65
PVC	18.18	7.25	18.11	16.30	18.14	6.70
PNVC	32.89	7.45	33.26	36.63	33.11	6.98 <sup>1</sup>
PC	51.07	7.50	51.38	6.98	51.22	7.20
PTVC	24.05	8.46	28.37	9.87	26.62	9.56
PTNVC	28.20	8.84	29.29	10.04	28.84	9.59
PTC	52.25	12.69	57.67	16.04	55.47	15.01

<sup>1</sup>MIDDLE GROUP - Students whose scores in the creativity pre-test total were in the middle 59%.



TABLE 3  
MEANS AND STANDARD DEVIATIONS OF LOW GROUP

	MALE (N=28)		FEMALE (N=20)		TOTAL (N=48)	
	MEANS	SD	MEANS	SD	MEANS	SD
VIQ	117.75	12.12	116.29	10.11	117.14	11.35
NVIQ	116.39	13.83	115.50	10.01	116.02	12.39
IQ	234.14	23.42	231.79	17.30	233.16	21.15
PVC	12.82	4.77	10.54	3.38	11.87	4.39
PNVC	19.64	5.73	21.59	5.37	20.45	5.67
PC	32.46	4.48	32.14	5.20	32.33	4.80
PTVC	20.75	7.68	19.04	7.17	20.04	7.52
PTNVC	22.39	5.51	21.09	4.71	21.85	5.32
PTC	43.14	11.12	40.14	10.19	41.89	10.85

LOW GROUP - Students whose scores in the creativity pre-test total were in the bottom 21%.

#### Correlation of Intelligence-Creativity for the High Creativity Group

There was a statistically significant correlation between the verbal creativity post-test (PTVC) scores and non-verbal IQ (NVIQ) scores for males. There were no other statistically significant correlations for this high group.

Although not statistically significant the correlations between verbal IQ (VIQ) scores and verbal creativity post-test (PTVC) scores were higher for females than were the verbal IQ (VIQ) scores and verbal creativity pre-test (PVC) scores for this group.

There were higher but not statistically significant correlations be-





tween the non-verbal IQ (NVIQ) scores and the non-verbal creativity post-test (PTNVC) scores than the correlations between non-verbal IQ (NVIQ) and non-verbal creativity pre-test (PNVC) scores for males, females and total group.

TABLE 4

## CORRELATION OF INTELLIGENCE AND CREATIVITY--HIGH GROUP

	N	PVC	PNVC	PC	PTVC	PTNVC	PTC
<b>VIQ</b>							
M	14	.18	-.35	-.11	.04	-.09	-.03
F	32	-.04	.10	.06	.19	.18	.25
Total	46	.01	.00	.02	.13	.11	.15
<b>NVIQ</b>							
M	14	.41	-.44	.04	.54**	.17	.38
F	32	-.16	.05	-.09	-.20	.12	-.04
Total	46	.00	-.04	-.03	-.06	.10	.02
<b>IQ</b>							
M	14	.32	-.44	-.03	.31	.03	.18
F	32	-.12	.09	-.01	.00	.19	.13
Total	46	.01	-.01	-.00	.04	.12	.10

\* significant at the .05 level

\*\* significant at the .01 level

Correlation of Intelligence and Creativity for the Middle Group

There were no statistically significant correlations between IQ and creativity pre-test scores for the middle group. There was a statistically significant correlation between verbal IQ (VIQ) and non-verbal creativity post-test (PTNVC) scores and between the verbal IQ (VIQ) and total creativity post-test (PTC) scores for the females. This correlation may be accounted for by the magnitude of the sample size. The increase in the verbal post-test creativity (PTVC) scores as compared to the verbal pre-test creativity (PVC) scores accounts for the significant correla-



tion between the total verbal IQ (VIQ) and total verbal creativity post-test (PTC) scores. The increase in the correlation of both the verbal and non-verbal post-test creativity (PTNVC) scores as compared with the pre-tests for the females accounts for the significant correlation between the non-verbal IQ (NVIQ) and total creativity post-test scores for the females of the middle group. This marked increase in the scores of the creativity post-tests by the females in the middle group also accounts for the significant correlations between IQ and creativity post-test scores for the total group. (Table 7).

#### Correlation of Intelligence and Creativity for the Low Group

There was a statistically significant correlation between the verbal IQ (VIQ) and the non-verbal creativity pre-test (PNVC) scores for the males of the low group. (Table 6). Apart from the above correlation there were no statistically significant relations between intelligence and creativity for the low group. However there was an increase in the correlations of the verbal IQ (VIQ) and the verbal creativity post-tests (PTVC) scores as compared with the correlations of verbal IQ and verbal creativity pre-test (PVC) scores for the males and females. There was a lower correlation between the non-verbal IQ (NVIQ) and the non-verbal post-test creativity scores as compared with the non-verbal IQ (NVIQ) and non-verbal pre-test creativity (PNVC) scores for the males which accounts for the decrease in the correlations of the total scores.



TABLE 5

## CORRELATION OF INTELLIGENCE AND CREATIVITY--MIDDLE GROUP

	N	PVC	PNVC	PC	PTVC	PTNVC	PTC
VIQ							
M	54	.05	-.09	-.03	.20	-.17	.01
F	79	-.05	.15	.10	.21	.29**	.31**
Total	133	-.00	.06	.05	.20*	.14	.22*
NVIQ							
M	54	-.05	-.01	-.06	.01	-.11	-.07
F	79	.06	.03	.09	.20	.19	.24*
Total	133	.01	.01	.01	.20	.06	.10
IQ							
M	54	-.01	-.05	-.06	.11	-.16	-.03
F	79	.00	.11	.11	.24**	.28**	.32**
Total	133	.00	.04	.04	.17	.11	.18*

TABLE 6

## CORRELATION OF INTELLIGENCE AND CREATIVITY--LOW GROUP

	N	PVC	PNVC	PC	PTVC	PTNVC	PTC
VIQ							
M	28	-.18	.38**	.29	.20	.03	.15
F	20	-.10	.00	-.06	.28	-.03	.18
Total	48	-.13	.23	.14	.23	.01	.17
NVIQ							
M	28	.20	.00	.22	.00	-.18	-.08
F	20	-.01	-.07	-.08	.28	.03	.21
Total	48	.15	-.03	.10	.10	-.11	.01
IQ							
M	28	.02	.19	.28	.11	-.09	.03
F	20	-.06	-.03	-.08	.32	.00	.23
Total	48	.01	.10	.13	.18	-.05	.10

Correlation of Intelligence and Creativity for the Total Population

The significant correlation of the verbal IQ (VIQ) and non-verbal





creativity pre-test (PNVC) scores for the males of the low group (Table 6) accounts for the significant correlation of the total verbal IQ (VIQ) and the non-verbal creativity pre-test (PNVC) scores for the total population (Table 7). The increase in the correlation of the post-test creativity scores and IQ for the high and middle groups and the significant correlations between the post-test creativity and IQ scores of the females in the middle group accounts for the significant correlation of the IQ and creativity post-test scores for the total group (Table 7).

TABLE 7

## CORRELATION OF INTELLIGENCE AND CREATIVITY--TOTAL POPULATION

	N	PVC	PNVC	PC	PTVC	PTNVC	PTC
VIQ							
M	96	.11	.11	.14	.20*	-.03	.10
F	131	.03	.16	.13	.24**	.26**	.30**
Total	227	.06	.14**	.13	.22**	.16*	.23**
NVIQ							
M	96	.20*	.17	.23*	.16	.02	.11
F	131	.05	.10	.10	.13	.18*	.19
Total	227	.11	.11	.14*	.11	.10	.13
IQ							
M	96	.18	.16	.21*	.20	-.01	.12
F	131	.05	.15	.13	.22**	.26**	.29**
Total	227	.10	.14*	.15	.19**	.15*	.20**

\* significant at the .05 level

\*\* significant at the .01 level

### Creativity and Behaviour Patterns

The Personality Inventory (Appendix B) of sixty-one items was administered to all of the students in classroom groups. A one-way Kolmogorov-Smirnoff test was applied to compare the actual distribution of the choices with a theoretical rectangular distribution. For all of the



items except item fifty-four the probabilities associated with the maximum deviation were significant at the .05 level. Therefore, in all cases the students did not make random choices.

The Kolmogorov-Smirnoff one-way test was then used to contrast the patterns of responses for the high, middle and low creativity groups. Sex difference for these creativity groups and the total population were also examined. There was a significant difference at the .01 level between the choices of the high creativity group and the low creativity group for fifteen of the items and at the .05 level for item six (Table 8). There were no significant differences in the choices on the Personality Inventory between the sexes.

#### Interest Range

There was a significant difference in the range of interests between students of high creative ability and students of low creative ability in items 2, 4, 6, 8, 58, and 61. The students of high creative ability participated more frequently in dramatic or oratorical productions, produced more sculpture, pottery and pictorial art work, and made more jewellery, toys and models than did students of low creative ability. Students of high creative ability also had taken significantly more lessons in music, dancing, speech, drama or art outside of school than did students of low creative ability.

There was an indication, not significantly different, that students of high creative ability were more interested in the culinary arts, creative writing, photography, and the investigation of problems in science and social studies, than were the low group. More students in the low creative group participated in adventuresome activities such as motorcycle crusades, freedom marches and week-end ski trips while the high creatives indicated that they seldom, or never, participated in these



activities.

A significantly greater number of creative students preferred folk music and electronic music; the students of less creative ability indicated a strong preference for the music of the hit parade. A significantly large percentage of the high creative students chose clothes as their gift preference; the low group also selected extravagant and lovely things as well as clothing.

### Family Background

There was a significant difference in the occupations of the fathers and the number of cities of residence. Thirty percent of the fathers of the high group were skilled workers while about thirty percent of the fathers of the low group were professionals. More students in the low group had lived in more than one city than did those of the high group.

There was very little difference between the groups in their family living experiences. All of the students visited relatives frequently but corresponded with relatives rarely. They participated in more outdoor activities with their families than they attended church or concerts. More than 50 percent of both groups participated in indoor activities very frequently and both groups indicated more than an average amount of family discussion on topics of the student's interest. Most of the students received clothes as gifts from their parents.

### Self-evaluation

Although most of the students in both groups indicated that they had a fair amount of creative ability a significantly greater number of the high creatives evaluated themselves as having average or above aver-





age creative ability. There was an indication that more students in the low group evaluated their memory ability as average or above average than did the students in the high group. More of the high students evaluated their written expression as very good or excellent than did the low group. The students in both groups rated their congeniality about the same.

### Attitudes

A significantly greater number of low creative students preferred to study independently or from their notes as compared to the high creative students who preferred to combine listening in class with reading of textbooks and library books. Both groups preferred to serve organizations for self-satisfaction but money was chosen by 20 percent of the low group as their reason to serve.

Although not statistically different the following trends were apparent. Most of the students chose to do their creative thinking privately as opposed to group work; their second choice was to work in groups with 1 or 2 others. Fifty percent of the low group chose respectability as the trait they desired most for themselves. The high group selected sense of humor, enthusiasm, and imagination as well as respectability. Of the students who indicated working at a collection about one-half of the low group chose stamps, coins or other similar collections. Forty percent of the total collected stamps or coins or had no collection; thirty percent of the high group were non-collectors, thirty percent of them also collected stamps and coins but twenty percent collected their own creative writing. About 30 percent of the high group and 20 percent of the low group said that they knew much more than the marks on their report cards indicated.



The students were asked to select one characteristic in each of four groups of five personality traits which they preferred in friends, parents and teachers. (See Appendix E). There were no significant differences in the choices of personality traits preferred in friends but the following trends were observed. In order of preference the personality traits preferred in friends by the whole group were the ability to get along well with others, loyalty, sense of humor, ability to listen, and truthfulness. The high creative males chose resourcefulness, open-mindedness, and the ability to get along well. The high creative female group chose the ability to get along well, truthfulness, resourcefulness, and ability to listen. Both females and males in the low group chose the ability to get along well, truthfulness, and loyalty.

In personality traits preferred in parents there was a significant difference between the groups for item 28 in which 20 percent of the low creative students selected confidence as the most important trait. The high creative students were divided in their choices, but also included imagination which the low creatives completely disregarded. The personality traits preferred in parents by the whole group in order of preference were open-mindedness, the ability to communicate, patience, the ability to listen, the ability to get along well, the ability to trust others, and insightfulness.

There was a significant high number of creative students who chose resourcefulness as a preferred trait in teachers. Apart from this choice all of the students indicated similar preferences: the ability to communicate, the ability to get along well with others, patience, open-mindedness and efficiency.



### Independence

A significantly greater number of low creative students chose the standard professions; 20 percent of the high creative students chose the professions which required creative ability such as, writer, inventor and artist.

Both groups indicated a high level of independence in the selection of their clothes. Both groups frequently attempted to make their own decisions with other members of the family, although not statistically significant the high group indicated being more successful in making these decisions. Twice as many students in the high group (18 as compared to 9) indicated financial independence. About 60 percent of both groups preferred styles which were suitable but more of the low group liked to be the first to follow new trends.

### Responsibility

There was a slight indication that the students of low creative ability accepted responsibility better than did the students of high creative ability, but this difference was not statistically significant. Most of the students in the total group indicated that they were able to accept responsibility for themselves at home.





TABLE 8

PERSONALITY INVENTORY - STUDENT RESPONSES  
ITEMS SIGNIFICANTLY DIFFERENT FOR THE HIGH AND THE LOW CREATIVITY GROUPS

Item	$\chi^2$	Level of significance
2	.209	.01
4	.234	.01
6	.151	.05
8	.246	.01
9	.177	.01
17	.179	.01
28	.186	.01
35	.267	.01
37	.186	.01
43	.251	.01
50	.208	.01
54	.201	.01
56	.247	.01
58	.207	.01
61	.218	.01

Intelligence, Creativity and Achievement

There were significant correlations at the .01 level between verbal IQ and achievement scores in both reading and writing for the high, middle, and low groups except for the low group when there was a significant correlation at the .05 level between verbal IQ and writing scores. For



the total population there was a significant positive correlation at the .01 level for verbal IQ (VIQ), non-verbal IQ (NVIQ) and total IQ scores with both the reading (R) and writing (W) scores. (Table 8). Although there was a significant correlation between IQ and reading scores, and IQ and writing scores, from the data in this study IQ scores could not be used to predict student success in objective reading and writing tests for more than 50% of the time.

There were no significant correlations between the pre-test creativity scores and either the reading or writing scores for any of the groups. But there were statistically significant correlations between the creativity post-test scores and both reading and writing for the total population. (Table 9). This may be accounted for by the large number of high IQ students who increased their creativity scores in the post-test. (See Appendix C).

#### Comparison of Group X and Group Y Mean Creativity Scores

The entire population of 227 students was separated into two groups-- Group X and Group Y for further investigation. The students in Group Y were those 160 students enrolled in the regular grade eleven classes. The 67 students in Group X were also enrolled in regular classes but they had been participants of experimental classes in English in which the teacher consciously attempted to assist students in the development of their creative talent.

The mean of the verbal IQ scores of Group X was 124.86 and the standard deviation was 13.14 and the mean non-verbal IQ score was 121.94 and the standard deviation was 11.78. The mean of the creativity pre-test scores was 55.97 with a standard deviation of 18.81 and the mean creativity post-test scores was 60.82 with the standard de-









TABLE 10  
MEANS AND STANDARD DEVIATIONS OF GROUP X<sup>1</sup>, GROUP Y<sup>2</sup>,  
AND TOTAL POPULATION

VARIABLES	GROUP X (N=67)		GROUP Y (N=160)		TOTAL (N=227)	
	MEANS	SD	MEANS	SD	MEANS	SD
VIQ	124.86	11.14	117.91	11.11	119.96	12.16
NVIQ	121.94	11.78	117.77	12.60	119.00	12.51
IQ	246.80	21.01	235.69	20.97	238.99	21.59
PVC	20.44	8.80	18.32	8.36	18.95	8.80
PNVC	35.53	11.80	32.94	11.86	33.70	11.90
PC	55.97	18.81	51.25	15.20	52.66	16.48
PTVC	30.91	11.33	24.73	9.53	26.55	10.48
PTNVC	29.91	10.40	37.90	10.08	28.49	10.22
PTC	60.82	18.81	52.64	15.93	55.05	17.24
<hr/>						
<sup>1</sup> GROUP X - experimental group	CODE FOR THE VARIABLES					
<sup>2</sup> GROUP Y - non-experimental group	VIQ - verbal intelligence					
	NVIQ - non-verbal intelligence					
	IQ - total intelligence					
	PVC - pre-test verbal creativity					
	PNVC - pre-test non-verbal					
	creativity					
	PC - pre-test creativity total					
	PTVC - post-test verbal creativity					
	PTNVC - post-test non-verbal					
	creativity					
	PTC - post-test total creativity					

in Group X had been in the experimental class for 2 months prior to the testing session. In the analysis of covariance, using the post-test creativity scores as criterion and the pre-test creativity scores as covariate, no significant difference was found between the mean post-test creativity scores.



### Six Factors of the Creativity Tests

Pearson product-moment correlations were computed among the three factors of fluency, flexibility, and elaboration for the pre-test verbal and non-verbal and the post-test verbal and non-verbal creativity tests. (See Table 11).

There was a significant correlation at the .01 level for non-verbal fluency with non-verbal flexibility for the pre-test score (.69) and the post-test score (.62) and between verbal flexibility and verbal fluency in the post-test scores (.73). It is evident that to achieve a high score for flexibility of ideas it was necessary to be fluent in the first place. Therefore, it would seem that students who scored high in fluency were more likely to score high in flexibility.

There were no significant inter-correlations between the non-verbal fluency and non-verbal elaboration scores indicating that on a timed creativity test the students who exhibited a fluency of ideas did not have the time or did not take the time to elaborate on these ideas. However there were significant inter-correlation between the scores of verbal fluency and verbal elaboration indicating that the students who were verbally fluent were able to elaborate on these ideas as well.

There were significant inter-correlations between the scores of elaboration on the verbal and non-verbal pre-tests and post-tests. There were significant correlations between verbal and non-verbal fluency scores on both pre-tests and post-tests. The inter-correlations between both the verbal and non-verbal flexibility scores in the pre-test and post-test were significant at the .01 level.



TABLE 11  
CORRELATION OF FLUENCY FLEXIBILITY AND ELABORATION IN  
VERBAL AND NON-VERBAL, PRE-TESTS AND POST-TESTS

NAME OF MEASURE	1	2	3	4	5	6	7	8	9	10	11	12
PRE-TEST												
Circle (non-verbal)												
Fluency	1	---										
Flexibility	2	.69**	---									
Elaboration	3	.13	.28**	---								
Unusual Uses (verbal)												
Fluency	4	.20**	.11	.12	---							
Flexibility	5	.19**	.10	.13	.20	---						
Elaboration	6	.06	.10	.33**	.16*	.14*	---					
POST-TEST												
Triangle (non-verbal)												
Fluency	7	.50**	.42**	.10	.06	.07	---					
Flexibility	8	.31**	.38**	.15*	.12	.08	.62**	---				
Elaboration	9	.07	.14*	.48**	.12	.10	.20**	.11	.24**	---		
Unusual Uses (verbal)												
Fluency	10	.23**	.23**	.13*	.48**	.35**	.07	.31**	.26**	.19**	---	
Flexibility	11	.11	.09	.09	.46**	.35**	.07	.21**	.22**	.12	.73**	---
Elaboration	12	.08	.08	.31**	.20**	.17*	.36**	.15*	.10	.29**	.16*	.18**
												---

\* significant at the .05 level  
\*\* significant at the .01 level





## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was designed to investigate the behavioural patterns of students who scored high on creativity tests as opposed to students who scored low on creativity tests. Furthermore, an investigation was made of the correlations between creativity and intelligence and among creativity, intelligence, and achievement. A secondary purpose was to investigate the possibility that creative ability as measured by creativity tests, could be increased.

The procedures used involved the collection of data relating to students' opinions, background, attitudes, family living experience, interests, and personality traits. Tests were administered to measure verbal and non-verbal creative ability in November of 1967. Six months later a second form of the same test was given. Achievement scores and IQ were obtained from the school records. The sample included 227 grade eleven students.

#### Intelligence and Creative Ability

There were very few statistically significant correlations between the total scores and sub-scores of the factors of IQ and creativity in both the pre-tests and post-tests. At the .01 level there was a significant correlation for the highly creative male student non-verbal IQ and their verbal creativity post-test scores (.54) and for the low creative male students verbal IQ scores with their non-verbal creativity pre-test scores (.38). There were significant correlations for the females in the middle group probably because of the large sample size. An additional factor was that the mean IQ score of this group was 119.



Getzels and Jackson (1962) and Torrance (1962) found the greatest variability in creativity occurred for individuals who had an IQ score near 120.

### Intelligence, Creativity, and Achievement

In general there were statistically significant correlations for the verbal, non-verbal, and total IQ scores with the STEP reading and STEP writing scores for the high, average, and low creativity groups. The exception to this pattern was the insignificant correlation between non-verbal IQ and both the STEP reading and STEP writing scores of the high creative group.

At the .05 level there was a significant correlation between the STEP reading and total creativity post-test scores for the middle group (.19). Apart from this there were no significant correlations between creativity and achievement scores in reading and writing. It would seem that standardized achievement tests in reading and writing did not measure any of the abilities which were tested by the creativity tests. The single correlation is unexplainable by the researcher.

### Creativity and Behavioural Patterns

A Personality Opinionnaire of 61 items was administered to all of the students in this study. Most of the students in the sample completed all of the data except for some of the items which were omitted when not applicable. A Kolmogorov-Smirnoff one-way test was used to compare the responses of the high, middle, and low creativity groups. There was a significant difference between the choices of high creative students and the low creative students on fifteen of the items. On the remaining 80 percent of the items there were differences indicating trends but for the most part the students seemed to be homogenous.

There were significant differences indicating that the creative



group had decidedly broader interests. They participated in more creative activities: drama, oratory, photography, painting, crafts, pottery, and sculpture. They also had taken more lessons in the fine arts subjects than did the low creative group. The creative students in this study showed a greater interest in folk music and electronic music; the low creative students indicated more conformity in selecting the music of the hit parade.

Significantly more of the fathers of the low creative students were in the professions; 30 percent of the fathers of the high creative group were skilled laborers. Significantly more of the low creatives had lived in more than one city than did the high creatives. A significantly greater number of high creative students evaluated themselves as being above average in creative ability.

More of the low creative students preferred to study independently than did the high creatives and more of the low creatives preferred to serve organizations for money than for other reasons. Generally the low creatives were more practical in terms of money, study methods and abilities in which they evaluated themselves as better than the average.

A significant number of low creative students chose confidence as a preferred trait in parents; a significant number of high creative students selected resourcefulness as an important characteristic in teachers.

Twenty percent of the high creative group selected occupations such as writer, inventor and artist, which is similar to the findings in other studies. (Torrance, 1962).

This study did not reinforce the image of the creative person as being excessively independent, unsociable, irresponsible or rebellious. The unfortunate picture of the withdrawn or troublesome creative person







may be changing.

The creative students in this study had broader interests, were more involved in creative activities than were low creative students. They seemed to be equally independent and sociable. For the most part their attitudes towards report cards, school subjects, teachers, friends and parents were similar.

#### Comparison of Group X and Group Y Mean Creativity Scores

There was no significant difference in the post-test creativity scores between the experimental group X and the non-experimental group Y. The non-experimental group had not been designed as a control group and the experimental group had been in the experimental English classes for two months before the pre-test was administered although the experimental techniques were not formally initiated. The experimental group was taught by the same teacher who utilized the techniques of group dynamics and brain storming in environmental conditions similar to those suggested by Torrance (1962), and Osborn (1962). Screen education was part of the English course for this experimental group. These facts may account for the statistically significant difference at the .001 level in the initial creativity test scores.

The mean for the creativity tests for Group X was 55.97 for the pre-test and 60.82 for the post-test. The mean for Group Y was 51.25 on the pre-test and 52.64 for the post-test. (See Table 10). Students increased their scores in the verbal post-test but because the test was timed it was impossible for them to score much higher. There was a decrease in the post-test non-verbal score for the experimental group. This may have been due to the fact that the emphasis in the class was on the development of verbal creativity.



Creative students who rated high in flexibility of ideas also seemed to rate high in fluency of ideas; therefore, students who produced the greater number of ideas were also more likely to have a greater diversity of ideas. Students who elaborated non-verbal ideas usually scored lower in fluency; the time restrictions may have caused these results. There were significant inter-correlations for each of the factors: fluency, flexibility and elaboration in the verbal and non-verbal pre-tests and post-tests.

These relationships would indicate definite need for changes in the administration of creativity tests. The findings in this study indicate that the relationship between scores on timed and untimed creativity tests should be examined. Kogan and Wallach (1965) investigated the relationship between IQ and creativity when creativity tests were not timed. However, the present study indicates that time pressure may affect the inter-relationships among various factors of creativity itself.

#### Recommendations for Further Research

1. Since there was a low correlation between objective English tests, and creative ability, a study should be made of the correlation between creative writing and the various factors of creativity.
2. The instruments employed in this study should be reexamined and refined. The Personality Inventory should be extended and finer distinctions should be made for comparison. Additional creativity tests should be used in experiments to find those which are most suitable for the various levels.
3. Further studies using untimed creativity tests should be employed in the measurement of creativity especially when attempting to



measure growth in creative ability.

4. In experiments for the development of creativity both the non-verbal and verbal abilities should be emphasized especially when the standardized measures test in both of these areas.





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## A P P E N D I C E S





## APPENDIX A

## MINNESOTA CREATIVITY TESTS--FORM A - PRE-TEST

The pre-test consisting of one non-verbal-Task 1 (Circles) and one verbal-Task 2 (Unusual Uses) was administered to all of the grade eleven students in one city high school in the month of November, 1967. The following is a sample of a students' test paper which has been scored according to the Revised Manual for Tests of Creative Thinking written by Yamamoto (1962).

Page 1

NAME \_\_\_\_\_

SCHOOL \_\_\_\_\_ SEX M( ) F( )

TEACHER \_\_\_\_\_

DATE \_\_\_\_\_

## Circles

Fluency	<u>16</u>	
Flexibility	<u>12</u>	
Elaboration	<u>10</u>	
Sub Total		<u>38</u>

## Unusual Uses

Fluency	<u>12</u>	
Flexibility	<u>4</u>	
Elaboration	<u>8</u>	
Sub Total		<u>24</u>

TOTAL		<u><u>62</u></u>
-------	--	------------------

62

## DIRECTIONS TO THE STUDENTS

## FORM A: TASKS 1 AND 2

In this booklet are two interesting tests. They will give you a chance to use your imagination to think of the most interesting and unusual ideas you can--ideas that no one else in the class will think of. After you think of an idea add to it and build it up to be interesting. There are two parts to the test. You will have 10 minutes for the first test and 8 minutes for the second.

DO NOT TURN TO THE SECOND TEST UNTIL THE SIGNAL IS GIVEN



F 16  
FL 12  
E 10  
38

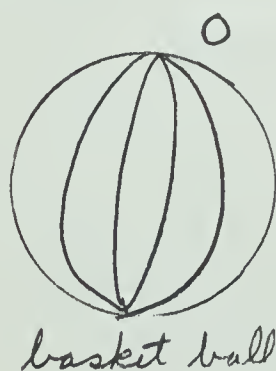
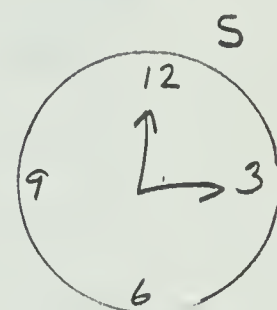
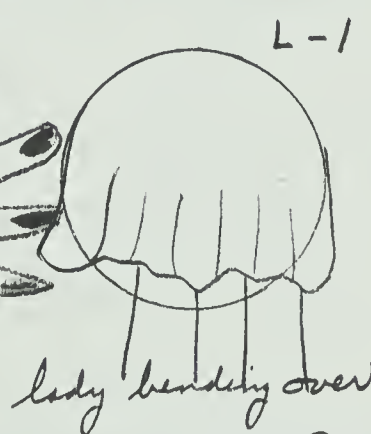
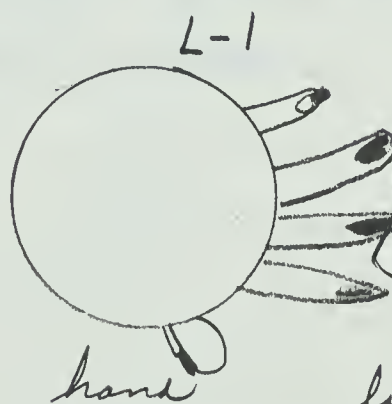
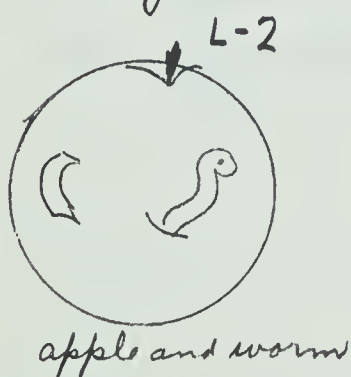
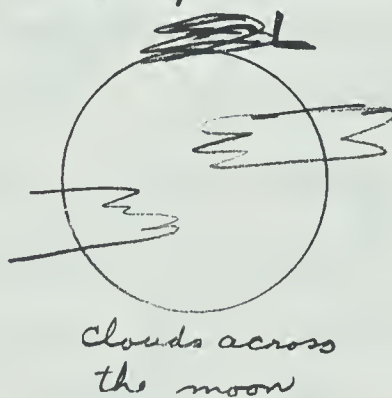
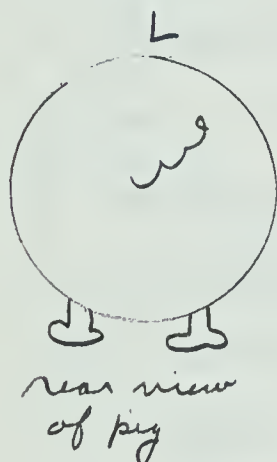
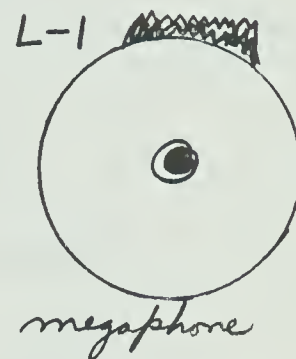
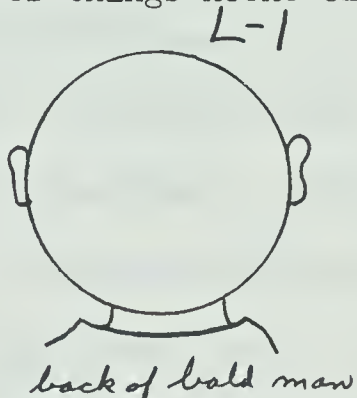
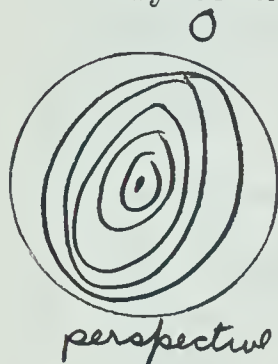
## TASK I CIRCLES

(38)

In ten minutes see how many objects or pictures you can make from the circles below and on the next page.

The circle should be the main part of whatever you make. With pencil or pen add lines to the circles to complete your pictures. You can place marks inside of the circles, outside of the circles or both inside and outside of the circles-- wherever you want to in order to make your pictures. Make as many pictures as you can. Put as many ideas as you can in each one. Add names or titles below the objects.

Try to think of things no one else will think of.





F 12  
FL 4  
E 8

## TASK II- UNUSUAL USES (TIN CANS)

24

Most people throw their empty tin cans away, but they have thousands of interesting and unusual uses. In the spaces below list as many of these interesting and unusual uses as you can think of. DO NOT limit yourself to any size of tin can. You may use as many cans as you like. DO NOT limit yourself to uses that you have seen or read about; think about as many possible new uses as you can.

- |    |                                       |     |
|----|---------------------------------------|-----|
| 1  | Flower pots                           | C   |
| 2  | Cut-up sunbursts                      | 0-1 |
| 3  | Cut up & curled - doll furniture      | 0-1 |
| 4  | Cut up - ornamental wall furnishings  | 0-1 |
| 5  | Half a large tin can - snow scraper   | 0-1 |
| 6  | Glued together - dividing wall        | 0-1 |
| 7  | Can & bell - cowbell                  | 0   |
| 8  | Cut up - jewellery                    | 0-1 |
| 9  | heads for puppets                     | 0   |
| 10 | armour for dolls                      | 0   |
| 11 | cut in half lengthwise - rocking crib | 5-P |
| 12 | huge can - chair                      | 0-1 |





## APPENDIX A

## MINNESOTA CREATIVITY TESTS--FORM B - POST-TEST

The post-test consisting of one non-verbal-Task 1 (Triangles) and one verbal-Task 2 (Unusual Uses) was administered to all of the grade eleven students in the month of May, 1968, six months after the pre-test. The following is a sample of a students' test paper which has been scored according to the Revised Manual for Tests of Creative Thinking written by Yamamoto (1962).

Page 1

NAME \_\_\_\_\_

SCHOOL \_\_\_\_\_ SEX M( ) F( )

TEACHER \_\_\_\_\_

DATE \_\_\_\_\_

## Triangles

Fluency	<u>15</u>
Flexibility	<u>6</u>
Elaboration	<u>11</u>
Sub Total	<u>32</u>

## Unusual Uses

Fluency	<u>17</u>
Flexibility	<u>11</u>
Elaboration	<u>7</u>
Sub Total	<u>35</u>

TOTAL	<u><u>67</u></u>
-------	------------------

67

## DIRECTIONS TO THE STUDENTS

## FORM B: TASKS 1 AND 2

This is another creativity test. You had one earlier in the year. It has been marked and you may see it later if you want to.

This test measures your ability to use your imagination. Think of the most interesting and unusual ideas you can. After you think of an idea add to it and build it up to be interesting. There are two parts to the test and two pages for each test.

You have 10 minutes for the first test and 8 minutes for the second test.

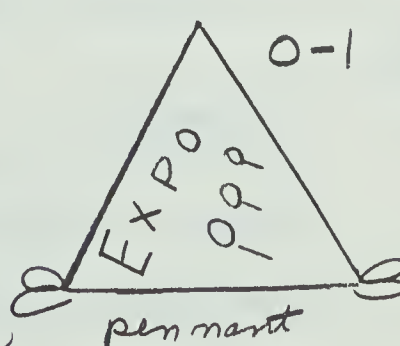
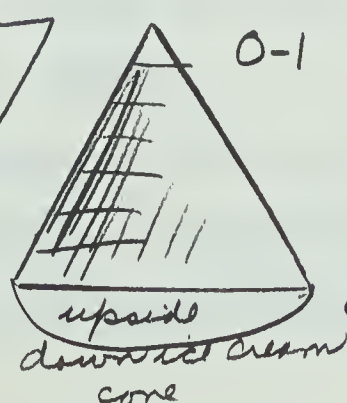
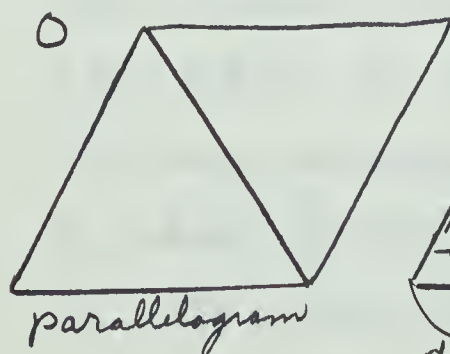
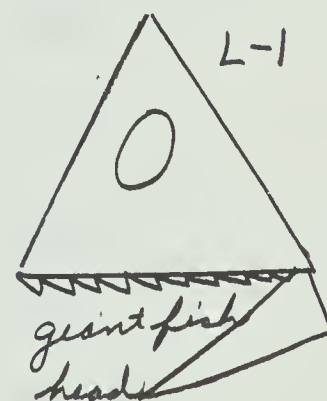
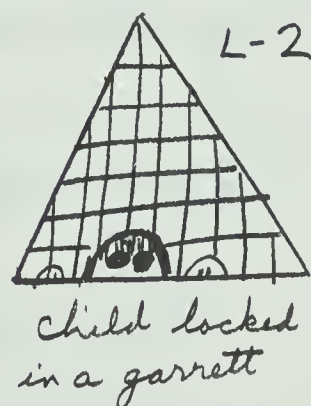
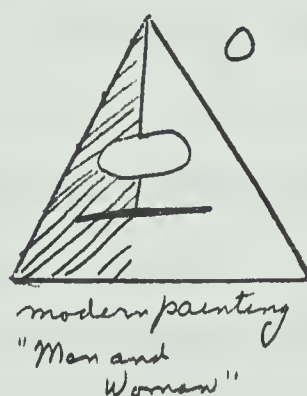
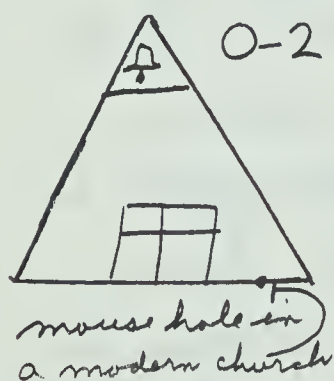
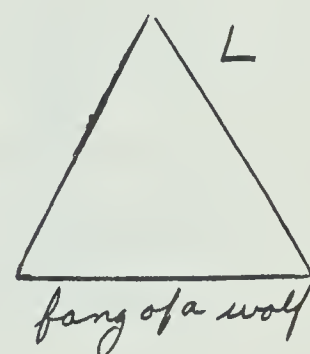
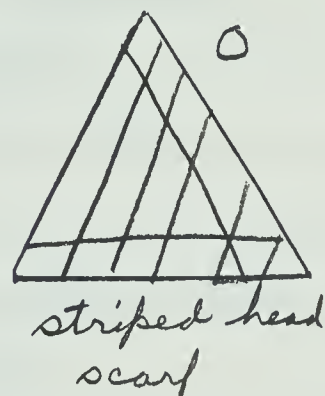
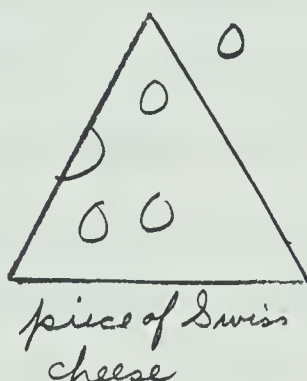
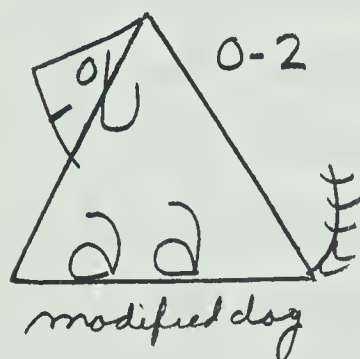
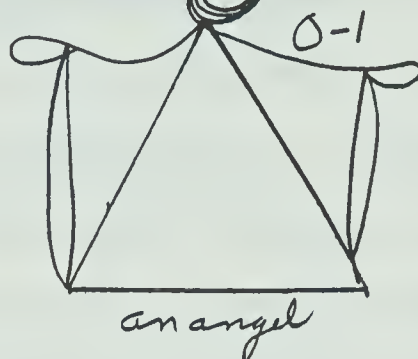
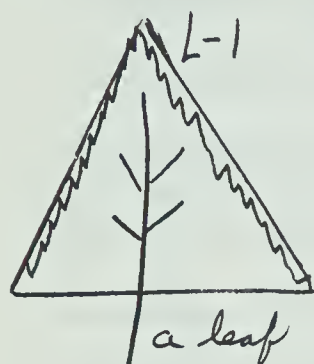
DO NOT TURN TO THE SECOND TEST UNTIL THE SIGNAL IS GIVEN



FI-15  
FL-6  
E-11  
32

## TASK I TRIANGLES

In ten minutes see how many objects or pictures you can make from triangles below and on the next page. The triangle should be the main part of whatever you make. With pencil or pen add lines to the triangles to complete your pictures. You can place marks inside the triangle, outside the triangle or both inside and outside the triangle-- whatever you want in order to make your picture. Try to think of things that no one else will think of. Make as many different pictures or objects as you can and put as many ideas as you can in each one. Make each picture tell as complete and as interesting a story as you can. Add titles or names below the objects.





F 17  
FL 11  
E 7

# TASK II-UNUSUAL USES (BRICKS) (8minutes)

35

Most people do not use old bricks; but they have thousands of interesting and unusual uses. In the spaces below list as many of these interesting and unusual uses as you can think of. DO NOT limit yourself to any size of brick. You may use as many bricks as you like. DO NOT limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can. Number your answers.

- 1 Break off pieces - put in dish - grow coral on it with chemical mixture 0-2
- 2 Use as part of a shelf B
- 3 To put hot dishes on 0
- 4 To mark a spot on the ground 0
- 5 To build a children's airplane 0
- 6 To draw a flower pot 0
- 7 To build steps to a tree house B
- 8 Book ends 0
- 9 to weigh down a box that has a light present in it S-1
- 10 to make stepping stones through mud B
- 11 drop them in a pond to make the water level rise S-1
- 12 write on sidewalks with S
- 13 build a wall to hide a door B-1
- 14 pave a patio B
- 15 use as ammunition in cannons (chunks) S-1
- 16 kill freshly caught fish with S
- 17 stand on to reach top of cupboard 0-1





## APPENDIX B

## STUDENT OPINIONNAIRE

This questionnaire was administered to all of the grade eleven students (N=253) in a city composite high school by the Head of the English Department of that school. He read the following instructions:

## DIRECTIONS FOR THE HIGH SCHOOL QUESTIONNAIRE

Teachers, administrators, university professors and others are interested in helping students develop their talents and abilities to the fullest extent. Many times they have failed to discover the special interests and skills of the young people in the schools.

One of the purposes of this questionnaire is to learn more about your preferences, abilities and activities.

Educators would also like to know your opinion about studying, your opinion about yourself and your opinion about other people in your environment.

What you say in your responses to the questions will be carefully studied and analyzed. The information will be computerized and the results will be analyzed. Although your name is on the paper it will be translated to a number by the computer and the information about individuals will not be disclosed to anyone.

The final analysis of pupil opinions will be available to you next September if you are interested in the results.

Please fill in the information at the top of the page.

Be sure to use an HB pencil.

Fill in one space for each answer. Do not write on the questionnaire.

You have about 20 minutes.



## APPENDIX B

## HIGH SCHOOL QUESTIONNAIRE

1. How often in the past year have you written a poem, a short story, play or skit which were not school assignments?
  1. Often (between 10 and 20 times)
  2. Very often (more than 20)
  3. Never (none)
  4. Sometimes (ten)
  5. Rarely (twice)
2. How often in the past year have you directed or taken part in the production of a skit, or puppet show, or made a speech, which were not class assignments?
  1. Often (between 10 and 20)
  2. Rarely (twice)
  3. Sometimes (ten)
  4. Very often (more than 20)
  5. Never (none)
3. How often in the past year have you thought of a way to improve a game or a science experiment?
  1. Never
  2. Rarely (twice)
  3. Sometimes (ten)
  4. Often (between 10 and 20)
  5. Very often (more than 20)
4. How often in the past year have you developed photographs, made a poster, sketched a scene, or painted a picture, which were not school assignments?
  1. Often (between 10 and 20)
  2. Very often (more than 20)
  3. Sometimes (ten)
  4. Rarely (twice)
  5. Never
5. How often in the past year have you taken colour photographs or black and white photographs?
  1. Never (none)
  2. Sometimes (6 rolls a year)
  3. Often (1 roll a month)
  4. Rarely (1 or 2 rolls a year)
  5. Very often (1 or more rolls a week)
6. In how many of these areas have you taken lessons, outside of school, for more than two years? Music, dancing, speech, drama, or art?
  1. 1 of these areas
  2. 2 or 3 of them
  3. 4 of these areas
  4. 5 of them
  5. None of these



7. How often in the past year have you tried to make up a recipe?  
(a salad, punch, special sandwich)
  1. Never
  2. Sometimes (ten)
  3. Often (between 10 and 20)
  4. Rarely (twice)
  5. Very often (more than 20)
8. How often in the past year have you built a model or made a toy or made some jewellery?
  1. Very often (more than 20)
  2. Often (between 10 and 20)
  3. Sometimes (ten)
  4. Rarely (twice)
  5. Never
9. How often in the past year have you made a wood carving, a soap carving, some pottery, or sculpture of any kind?
  1. Very often (more than 20)
  2. Never
  3. Rarely (twice)
  4. Sometimes (ten)
  5. Often (between 10 and 20)
10. How often in the past year have you investigated a problem in social studies or science by reading or experimenting, with no help from adults?
  1. Often (between 10 and 20)
  2. Never
  3. Rarely (twice)
  4. Sometimes (ten)
  5. Very often (more than 20)
11. If you have a pet, indicate the category into which it falls.
  1. Rats, mice, or guinea pigs
  2. Horses
  3. Dogs or cats
  4. I do not have a pet.
  5. I have a pet which is none of the above
12. If you have started or worked at a collection, indicate the one in the following list which is closest to it.
  1. Stamp or coin
  2. Leaf or wild flowers
  3. Your own writing
  4. Insects or butterflies
  5. No collection





13. How often in the past year have you taken part in a daring adventure such as a motorcycle crusade, or a freedom march, or a week-end ski trip?
  1. Never
  2. Once
  3. 2 or 3 times
  4. 4 or 5 times
  5. More than 6 times
14. Which of the following subject areas do you think is in most need of improvement in subject matter or method of study etc?
  1. Social Studies
  2. Mathematics
  3. Science
  4. English
  5. None of these
15. Which of the following qualities do you admire most in a parent?
  1. Firmness
  2. Ability to communicate
  3. Flexibility
  4. Enthusiasm
  5. Loyalty
16. Which of the following qualities in a parent helps you most?
  1. Efficiency
  2. Truthfulness
  3. Open-mindedness
  4. Intelligence
  5. Sense of humor
17. Which of the following qualities do you think is most important for a parent?
  1. Confidence
  2. Imagination
  3. Easy to get along with
  4. Ability to trust others
  5. Insightfulness
18. Which of the following qualities do you think is the most important for a parent?
  1. Purposefulness
  2. Patience
  3. Forcefulness
  4. Resourcefulness
  5. Ability to listen



19. Which of the following qualities do you admire most in a friend?
  1. Firmness
  2. Ability to communicate
  3. Flexibility
  4. Enthusiasm
  5. Loyalty
20. Who in the following list would you say influenced you the most during the past year?
  1. Father
  2. Mother
  3. One or more of your teachers
  4. One or more of your friends
  5. One or more relatives other than your parents
21. Which of the following qualities in a friend is the most desirable?
  1. Efficiency
  2. Truthfulness
  3. Open-mindedness
  4. Intelligence
  5. Sense of humor
22. Which of the following qualities do you think most important for a friend?
  1. Confidence
  2. Imagination
  3. Easy to get along with
  4. Ability to trust others
  5. Insightfulness
23. Which of the following qualities do you think most important for a friend?
  1. Purposefulness
  2. Patience
  3. Forcefulness
  4. Resourcefulness
  5. Ability to listen
24. Which of the following traits do you desire most for yourself?
  1. Imagination
  2. Intelligence
  3. Sense of humor
  4. Respectability and integrity
  5. Enthusiasm
25. Which of the following qualities do you admire most in a teacher?
  1. Firmness
  2. Ability to communicate
  3. Flexibility
  4. Enthusiasm
  5. Loyalty



26. Which of the following qualities in a teacher helps you to learn best?
1. Efficiency
  2. Truthfulness
  3. Open-mindedness
  4. Intelligence
  5. Sense of humor
27. Which of the following qualities do you think is the most important for a teacher?
1. Confidence
  2. Imagination
  3. Easy to get along with
  4. Ability to trust others
  5. Insightfulness
28. Which of the following qualities do you admire most in a teacher?
1. Purposefulness
  2. Patience
  3. Forcefulness
  4. Resourcefulness
  5. Ability to listen
29. Which of the following best describes your attitude towards big changes in style in clothing, or style of hair in so far as you would follow the trend?
1. Prefer to wait to see how many of my friends accept the style
  2. Like to be the first in my group to start the trend
  3. Prefer not to be influenced by fashions or fads
  4. Wait until my close friends convince me to accept the new style
  5. Prefer the styles which are the most suitable for me
30. According to your evaluation of yourself, how would you rate your ability to put your thoughts into writing?
1. Excellent
  2. Very good
  3. Good
  4. Fair
  5. Poor
31. To what extent do you participate in school clubs, or church organizations, or other youth associations? (total of these)
1. Very often (2 or more times a week)
  2. Often (once a week)
  3. Rarely (once a month)
  4. Sometimes (twice a month)
  5. Never





32. According to your evaluation of yourself, how would you rate your ability to express yourself orally?
1. Excellent
  2. Very good
  3. Good
  4. Fair
  5. Poor
33. According to your evaluation of yourself, how would you rate your ability to memorize facts?
1. Excellent
  2. Very good
  3. Good
  4. Fair
  5. Poor
34. How adequately would you say your report card marks indicate your ability?
1. Very accurately
  2. I know much more than the marks show
  3. About half of my marks are right
  4. All marks are prejudiced
  5. No comment
35. According to your evaluation of yourself, how would you say that your creative ability compared with other pupils in your grade?
1. Top 10%
  2. Top 20%
  3. Top 30%
  4. Top half of the class
  5. Bottom half of the class
36. Indicate the most recent method of protest which you have indulged in over something which you thought was unfair.
1. Destroyed a dollar bill
  2. Destroyed a credit card
  3. Destroyed an examination or essay or report card
  4. Some other way not listed here
  5. No protest
37. If you were called in to assist with a youth club activity for which of the following reasons would you prefer to offer your services?
1. Money
  2. Some other reason not listed here
  3. Self-satisfaction or self-pleasure
  4. Recognition (having your name announced on your favorite radio station)
  5. Not interested in assisting any organizations



38. To what extent are you allowed to select your own clothes?
1. Often
  2. Never
  3. Very often
  4. Sometimes
  5. Rarely
39. How often do you try to make decisions with which other members of your family do not agree?
1. Frequently (once a month)
  2. Very often (twice a month)
  3. Very frequently (twice or more a week)
  4. Rarely (twice a year)
  5. Never
40. How often are you successful in making decisions with which other members in your family do not agree?
1. Frequently (once a month)
  2. Never
  3. Very frequently (twice or more a week)
  4. Rarely (twice a year)
  5. Very often (twice a month)
41. Which of the following categories expresses best your financial independence? (do not include any allowances)
1. I buy my own clothes and earn my own spending money
  2. I earn all my own spending money but do not pay for my clothes
  3. I earn a part of my spending money
  4. I earn no money
  5. I pay all of my own expenses
42. When someone wishes you to make friends with a particular person, which of the following do you do?
1. Make an attempt to be friendly
  2. Get well enough acquainted to decide whether or not to become friends
  3. Ignore the person if he or she does not appeal to me
  4. Make no special effort either way
  5. Haven't had this experience
43. Approximately in how many different cities or towns have you lived?
1. One city
  2. Two
  3. Between three and six
  4. Between seven and ten
  5. More than ten places



44. How many different junior and senior high schools have you attended?
1. Two
  2. Three to five
  3. Six
  4. Seven to eight
  5. More than eight
45. How often do you visit relatives? (grandparents, aunts, uncles, cousins, married brothers or sisters) (total number in the past year)
1. Frequently (once a month)
  2. Very often (twice a month)
  3. Very frequently (twice or more a week)
  4. Rarely (twice a year)
  5. Never
46. How often do you correspond with your relatives? (total number in the past year)
1. Frequently (once a month)
  2. Very often (twice a month)
  3. Very frequently (twice or more a week)
  4. Rarely (twice a year)
  5. Never
47. To what extent do you do some of these things with members of your family? (boating, swimming, skiing, picnicing, hikeing, golfing)
1. Frequently (once a month)
  2. Very often (twice a month)
  3. Very frequently (twice or more a week)
  4. Rarely (twice a year)
  5. Never
48. To what extent do you do some of these things with your family? (attend church, concerts, movies; see hockey or ball games)
1. Frequently (once a month)
  2. Very often (twice a month)
  3. Very frequently (twice or more a week)
  4. Rarely (twice a year)
  5. Never
49. To what extent do you do some of these things with your family? (watch television, enjoy records, read, play chess, cards etc.)
1. Frequently (once a month)
  2. Very often (twice a month)
  3. Very frequently (twice or more a week)
  4. Rarely (twice a year)
  5. Never





50. Which of the following occupation groups is most like that of your father or gaurdian?
1. Sales or clerical staff (store clerk, salesman, bank teller)
  2. Professional (doctor, lawyer, accountant, minister, teacher)
  3. Unskilled worker (builder's helper, laborer, food services, caretaker)
  4. Skilled worker (electrician, plumber, painter, mechanic, cab or truck driver)
  5. Managerial (business executive, manager, administrator)
51. To what extent are your views on religion, politics, school or public affairs listened to by members of your family?
1. Often
  2. Very often
  3. Never
  4. Rarely
  5. Sometimes
52. How well do you get along with your school friends?
1. Very well
  2. Fairly well
  3. When I want to
  4. Not at all well
  5. Cannot be bothered with the kids at school
53. In what sort of situation do you do your best creative thinking (get the best ideas and insight)
1. Alone
  2. With one or two others
  3. With a group over six
  4. In any situation
  5. Don't know
54. To make good marks in a subject like Social Studies or English which of the following ways do you prefer to learn?
1. By independent study
  2. By listening carefully in class
  3. By reading text books and library books
  4. By studying my notes
  5. Combination of two and three
55. Do you do your homework, tidy your room and get home at reasonable times without being reminded by your parents or instructed to do so by your parents?
1. Always
  2. Most of the time
  3. Rarely
  4. Some of the time
  5. Never



56. Which of the following job categories comes closest to the work you would like to be engaged in ten years from now?
1. Office work, business (secretarial or managerial)
  2. Professional (doctor, lawyer, teacher, engineer, accountant)
  3. Writer, inventor, artist (journalism, interior decorating, poet, designer)
  4. Service (food services, housewife, social service)
  5. Have absolutely no idea.
57. Which of the following foods would you prefer to eat or to sample on a special occasion when you are eating at a restaurant?
1. Hamburger Deluxe with all the trimmings
  2. Chinese food
  3. Delmonaco steak, baked potatoes, etc.
  4. Borsh and cabbage rolls
  5. Dolma and sarma
58. Which of the following kinds of music are you most interested in listening to?
1. Classical (symphonies or opera)
  2. Top ten (hit parade)
  3. Folk
  4. Way-out music (electronic)
  5. Popular familiar music (Mantovani, Belafonte or Classical Jazz)
59. Which of the following would you choose for a camping holiday?
1. A site near the sea or a lake
  2. A site near a large city
  3. An unexplored northern island
  4. A mountain sports resort
  5. An established camping area
60. Which of the following best describes the kinds of gifts which you receive from your parents? (last birthday or Christmas)
1. Books
  2. Clothes
  3. Materials for hobbies, crafts, or dressmaking, etc.
  4. Camera equipment, bike, expensive sports equipment
  5. Wristwatch, jewellery, or luxury items
61. Which of the following best describes the kind of gifts which you prefer to receive.
1. Useful things like clothing
  2. Lovely things which I would not buy for myself
  3. Extravagant things like a wristwatch or bike
  4. Inexpensive gifts which are carefully chosen and interesting
  5. Books, games or hobby material



## APPENDIX C

RAW SCORES FOR IQ, CREATIVITY PRE-TEST<sup>1</sup>, CREATIVITY POST-TEST<sup>2</sup>,  
ACHIEVEMENT IN READING (R), ACHIEVEMENT IN WRITING (W), FOR  
MALES, FEMALES, EXPERIMENTAL GROUP (X), NON-EXPERIMENTAL GROUP (Y)

ID	SEX	GROUP	IQ	R	W	C <sup>1</sup>	C <sup>2</sup>
L	F	X	131*	32*	19	39	56
2	F	Y	114	27	19	47	25x
3	F	Y	119	26	14	55	53
4	M	X	120	32*	17	59	59
5	F	X	133*	33*	23*	39	58
6	M	X	103x	25	12	20x	56
7	M	X	128	21x	13	64	54
8	M	Y	131*	29*	21*	41	31x
9	F	Y	119	30*	11x	65*	42
10	F	X	132*	31*	16	61	65
11	F	Y	141*	31*	20*	61	96*
12	F	Y	119	25	15	37x	31x
13	F	Y	126	27	20*	74*	72*
14	F	X	123	24	18	36x	56
15	F	X	131*	29*	12	44	63
16	M	Y	101x	19x	16	48	59
17	F	Y	125	24	17	95*	109*
18	F	Y	111	26	18	61	46
19	F	Y	116	25	15	23x	32x
20	F	Y	131*	31*	17	50	71*
21	M	Y	110x	24	10x	34x	57
22	F	X	109x	23	16	62	72*
23	M	Y	117	23	14	59	54
24	M	Y	119	24	18	47	65
25	F	X	122	22	18	52	40
26	M	Y	115	27	19	59	58
27	F	X	118	25	14	43	48
28	M	Y	130*	26	12	78*	56
29	M	Y	132*	23	16	88*	85*
30	M	Y	107x	24	16	48	47
31	M	X	120	22	13	47	57
32	F	Y	111	23	13	50	75*
33	F	Y	129	23	19	31x	56
34	F	Y	132*	28	23*	42	54
35	F	X	104x	26	11x	71*	67
36	F	X	129	18x	15	56	70*
37	M	Y	118	29*	17	36x	48
38	F	Y	112	19x	12	48	47

\* upper 20 percent

x lower 20 percent





## Appendix C--(Continued)

RAW SCORES FOR IQ, CREATIVITY PRE-TEST<sup>1</sup>, CREATIVITY POST-TEST<sup>2</sup>,  
ACHIEVEMENT IN READING (R), ACHIEVEMENT IN WRITING (W), FOR  
MALES, FEMALES, EXPERIMENTAL GROUP (X), NON-EXPERIMENTAL GROUP(Y)

ID	SEX	GROUP	IQ	R	W	C <sup>1</sup>	C <sup>2</sup>
39	F	Y	129	21x	17	81*	63
40	F	X	118	24	20*	95	103**
41	F	X	111	21x	10x	69*	90*
42	F	Y	93x	22	14	38x	42
43	F	Y	96x	22	8x	44	51
44	F	X	113	30x	19	49	64
45	F	Y	112	26	18	43	46
46	F	Y	116	22	8x	48	40
47	F	X	131*	30*	19	45*	58
48	F	X	129	32*	20*	76*	73*
49	M	Y	93	17x	12	46	40
50	M	X	131*	32	13	63	40
51	M	Y	128	29*	20*	44	38x
52	M	Y	131*	28	16*	31x	35x
53	F	X	102x	29*	22*	63	89*
54	M	Y	114	16x	7x	60	82*
55	M	X	113	21x	15	27x	40
56	M	Y	113	25	17	37x	55
57	F	Y	123	26	16	48*	67
58	F	Y	97x	17x	14	88*	56
59	M	Y	137*	30*	18	52	48
60	M	Y	124	28	13	46	55
61	F	Y	123	27	20*	52	54
62	M	Y	129	29*	17	40	42
63	F	Y	114	27	15	50	38x
64	M	Y	129	28	15	72*	54*
65	F	X	140*	29*	20*	89*	103*
66	M	Y	112	21x	17	48	43
67	M	Y	123	26	18	35x	21x
68	M	Y	119*	25	15	48	52
69	F	X	138*	33*	18	70*	62
70	M	Y	117	19x	10x	53	47
71	M	Y	108x	16x	8x	41	25x
72	F	Y	124	24	13	88*	39x
73	F	Y	108x	22	12	42	44
74	M	Y	128	30*	12	52	70*
75	F	Y	114	23	19	36x	49
76	M	Y	109x	25	17	72	13x



## Appendix C--(Continued)

RAW SCORES FOR IQ, CREATIVITY PRE-TEST<sup>1</sup>, CREATIVITY POST-TEST<sup>2</sup>,  
ACHIEVEMENT IN READING (R), ACHIEVEMENT IN WRITING (W), FOR  
MALES, FEMALES, EXPERIMENTAL GROUP (X), NON-EXPERIMENTAL GROUP (Y)

ID	SEX	GROUP	IQ	R	W	C <sup>1</sup>	C <sup>2</sup>
77	M	Y	109x	18x	14	37x	34x
78	F	Y	106x	33*	18	42	37x
79	M	X	118	26	17	96*	68
80	F	Y	112	29*	21*	62	85*
81	F	Y	110x	26	12	50	39x
82	F	Y	106x	22	8x	43	52
83	M	Y	130*	26	13	46	44
84	M	Y	111	26	11x	35x	54
85	M	Y	97x	23	11x	22x	31x
86	M	Y	130*	29*	19	35x	31x
87	M	Y	120	25	10x	37x	47
88	M	Y	133*	27	15	51	39x
89	F	X	126	28	15	54	76*
90	F	X	139*	29*	21*	43	65
91	M	Y	116*	27*	19	33x	38x
92	F	X	135*	31*	21*	53	61
93	M	Y	115	31*	17	60	74*
94	F	X	122	25	17	44	39x
95	M	Y	107x	14x	2x	38x	44
96	M	X	123	31*	20*	49	48
97	F	Y	113	20x	19	23x	38x
98	F	Y	104x	21x	15	67*	66
99	M	X	140*	24	12	77	60
100	F	Y	111	24	20*	55	73*
101	M	Y	121	28	11x	46	43
102	F	X	135*	26	24*	45	57
103	F	Y	117	32*	19	64	43
104	F	X	116	23	16	51	45
105	F	Y	132*	28*	15	57	68
106	M	Y	123	31	19	32x	50
107	F	Y	110.5	26	17	43	48
108	F	Y	114	26	15	42	76*
109	M	X	126	26	14	80*	51
110	M	Y	103x	19x	14	56	51
111	M	Y	105x	19x	12	46	53
112	M	Y	113	29*	11x	60	53
113	F	X	139*	30*	17	73*	78*
114	M	Y	137*	26	17	57	38x



## Appendix C--(Continued)

RAW SCORES FOR IQ, CREATIVITY PRE-TEST<sup>1</sup>, CREATIVITY POST-TEST<sup>2</sup>,  
ACHIEVEMENT OM READING (R), ACHIEVEMENT IN WRITING (W), FOR  
MALES, FEMALES, EXPERIMENTAL GROUP (X), NON-EXPERIMENTAL GROUP (Y)

ID	SEX	GROUP	IQ	R	W	C <sup>1</sup>	C <sup>2</sup>
115	F	Y	114	23	19	56	37x
116	F	Y	120	26	17	60	47
117	F	Y	117	25	17	49	53
118	F	Y	117	18x	15	30x	34x
119	M	Y	126	29*	10x	32x	62
120	F	Y	132*	29*	19	73*	78*
121	M	Y	134*	29*	18	58	58
122	F	Y	121	25	16	70*	51
123	M	Y	108x	17x	9x	29	36x
124	M	Y	137*	28	17	51	69*
125	F	Y	105x	23	18	37	36x
126	M	Y	129	22	14	56	54
127	F	Y	136*	27	20*	49	47
128	M	Y	118	26	15	46	40
129	M	Y	118	29*	14	39	45
130	M	Y	127	17x	13	86*	74*
131	F	Y	116	30*	21*	28x	62
132	F	X	120	33*	19	69*	83*
133	M	X	141*	31*	19	35	39x
134	F	Y	124	28	15	53	51
135	M	Y	126	25	12	58	80*
136	F	X	111	25	18	97*	62
137	F	Y	110.5	22	17	64	59
138	F	Y	110.5	22	12	52	59
139	F	X	130*	24	17	64	71*
140	M	Y	122	21x	13	34x	42
141	F	Y	123	29*	17	85*	69*
142	M	Y	124	11x	17	40	44
143	F	Y	119	25	18	73*	59
144	F	Y	120	27	19	51	82*
145	F	Y	108x	21x	15	49	53
146	F	X	135*	29*	22*	60	52
147	F	Y	112	25	14	55	56
148	F	Y	130*	30*	13	48	68
149	F	X	130*	27	17	35x	41
150	M	Y	107x	28	20*	47	68*
151	M	Y	107x	24	15	34x	43
152	F	X	121	23	15	23x	38x





## Appendix C--(Continued)

RAW SCORES FOR IQ, CREATIVITY PRE-TEST<sup>1</sup>, CREATIVITY POST-TEST<sup>2</sup>,  
ACHIEVEMENT ON READING (R), ACHIEVEMENT IN WRITING (W), FOR  
MALES, FEMALES, EXPERIMENTAL GROUP (X), NON-EXPERIMENTAL GROUP (Y)

ID	SEX	GROUP	IQ	R	W	C1	C2
153	F	Y	119	26	19	37x	42
154	F	X	108x	30*	12	34x	23x
155	F	Y	115	24	15	47	35x
156	F	Y	122	29*	6x	63	58
157	M	X	110x	23	19	62	58
158	F	Y	132	31*	20*	58	55
159	F	Y	119	29*	19	77*	80*
160	F	X	104x	22	16	90*	81*
161	F	Y	121	28	14	32x	32x
162	F	Y	118	28	14	65*	50
163	F	Y	118	18x	15	52	44
164	F	Y	107x	25*	10x	53	50
165	M	X	125	31*	15	35x	57
166	F	Y	122	28	17	71*	88*
167	F	X	120	26	10x	52	55
168	M	X	123	25	8x	32x	65
169	F	Y	127	30*	20*	38x	39x
170	F	Y	127	21x	13	70*	45
171	F	Y	120	28	9x	77*	59
172	F	Y	123	28	21*	59	70*
173	F	X	111	24	17	53	63
174	M	X	136*	28	13	42	65
175	F	Y	115	24	18	63	66
176	F	Y	101x	16x	10x	51	57
177	M	Y	118	18x	11x	30x	41*
178	M	Y	136*	26	13	43	71*
179	F	X	123	27	19	64	102*
180	F	Y	107x	13x	13	38x	29x
181	F	X	119	27	21*	79*	93*
182	F	X	118	26	13	68*	58
183	F	Y	127	24	17	56	91*
184	M	Y	95x	20x	8x	36x	47
185	M	Y	132*	26	17	41	45*
186	M	Y	122	26	12	76*	76*
187	M	Y	102x	13x	11x	30x	23x
188	M	X	134*	29*	18	41	55
189	M	X	133*	31*	12	26	48
190	F	Y	132*	26	18	54	62



## Appendix C--(Continued)

RAW SCORES FOR IQ, CREATIVITY PRE-TEST<sup>1</sup>, CREATIVITY POST-TEST<sup>2</sup>,  
ACHIEVEMENT IN READING (R), ACHIEVEMENT IN WRITING (W) FOR  
MALES, FEMALES, EXPERIMENTAL GROUP (X), NON-EXPERIMENTAL GROUP (Y)

ID	SEX	GROUP	IQ	R	W	C <sup>1</sup>	C <sup>2</sup>
191	M	Y	144*	30*	19	71*	63
192	F	X	109x	15x	10x	25x	37x
193	M	X	125	21x	15	41	21x
194	M	Y	112	20x	13	42	50
195	M	Y	129	21x	10x	67*	41
196	F	X	136*	23	13	57	104*
197	F	Y	115	27	14	31x	31x
198	M	Y	115	26	14	56	64
199	F	X	119	23	13	98*	87*
200	M	X	139*	26	14	38x	31x
201	F	Y	95	15x	8x	50	29x
202	M	Y	121	23	13	61	68
203	M	Y	116	20x	10x	56	39x
204	M	Y	122	27	16	94*	60
205	F	Y	93	20x	7x	46	56
206	M	Y	112	26	14	64	57
207	F	Y	114	27	10x	45	77*
208	M	Y	112	17x	12	59	49
209	F	X	119	26	19	51	43
210	F	X	123	23	17	71*	50
211	F	Y	120	24	9x	62	60
212	F	X	115	26	16	65*	70*
213	F	Y	98x	22	17	41	34x
214	M	X	107x	21x	6x	76*	93*
215	F	Y	136*	28	22*	42	46
216	M	Y	128	27	20*	63	45
217	F	Y	108x	28	13	43	59
218	F	Y	126	33*	30*	51	64
219	M	Y	130*	26	11x	72*	80*
220	F	Y	133*	29*	20*	81*	49
221	F	Y	113	26	19	51	53
222	M	Y	108x	23	9x	29x	33x
223	F	X	122	26	17	57	37x
224	M	Y	117	23	16	48	44
225	F	Y	109x	21	13	31x	55
226	F	Y	107x	15x	8x	44	52
227	M	Y	109x	24	14	50	69



## APPENDIX D

PERSONALITY INVENTORY - STUDENT RESPONSES								BACKGROUND	
ITEM	DESCRIPTION	GROUP	1	2	choices		5	K-S D*	level of significance
					3	4			
50	FATHER'S OCCUPATION	H	8	18	3	14	3	.215	.01
		M	20	47	18	32	11		
		L	13	15	8	10	1		
43	No. of cities of residence	H	1	2	13	6	24	.326	.01
		M	7	4	28	39	55		
		L	1	2	11	21	13		
44	No. of schools attended	H	0	0	1	17	28	.586	.01
		M	1	0	2	41	89		
		L	0	0	0	13	35		
20	Influencial person	H	4	13	2	27	0	.154	.01
		M	18	32	8	64	11		
		L	12	10	2	22	2		
31	Participation in clubs	H	11	10	7	13	5	.093	.01
		M	37	32	15	37	12		
		L	11	10	6	13	8		
SELF-EVALUATION									
30	Written expression	H	3	10	21	12	0	.198	.01
		M	2	24	55	33	19		
		L	2	4	25	11	6		
32	Oral Expression	H	1	6	23	13	3	.251	.01
		M	3	19	66	34	11		
		L	1	3	22	15	7		
33	Memory ability	HH	3	9	16	15	3	.145	.01
		M	7	45	43	30	8		
		L	8	9	18	12	1		
35	Creative ability	H	6	9	10	18	3	.214	.01
		M	6	22	24	61	23		
		L	2	5	6	22	12		
36	Regard for awards	H	2	8	33	1	2	.546	.01
		M	12	45	58	7	1		
		L	11	3	32	0	2		





## Appendix D--(Continued)

PERSONALITY INVENTORY - STUDENT RESPONSES									
CREATIVE ACTIVITIES									
ITEM	DESCRIPTION	GROUP	choices					K-S D	level of significance
			1	2	3	4	5		
1	Creative writing	H	2	8	9	11	16	.304	.01
		M	1	8	33	32	59		
		L	0	2	2	13	31		
2	Drama	H	1	1	3	19	22	.361	.01
		M	0	5	15	41	72		
		L	0	0	2	2	11		
3	Science and recreation	H	2	3	11	20	10	.282	.01
		M	8	7	34	42	42		
		L	2	5	11	18	12		
4	Pictorial art	H	9	6	13	10	8	.123	.01
		M	24	18	39	27	25		
		L	4	1	13	11	19		
5	Photography	H	2	7	15	12	10	.176	.01
		M	3	15	45	49	21		
		L	0	5	13	14	16		
6	Lessons in fine arts	H	0	1	6	16	23	.242	.01
		M	0	1	18	58	56		
		L	1	0	2	24	21		
7	Culinary art	H	7	4	12	9	14	.150	.01
		M	5	16	30	43	39		
		L	1	2	13	16	16		
9	Sculpture	H	2	5	6	6	27	.256	.01
		M	2	8	13	33	73		
		L	0	0	3	7	38		
8	Craftwork	H	2	5	12	13	14	.313	.01
		M	2	11	25	53	42		
		L	0	3	5	15	25		
10	Study problems-- independent	H	3	6	14	10	13	.163	.01
		M	4	14	30	55	30		
		L	1	2	11	19	15		
13	Adventure	H	15	2	11	0	18	.225	.01
		M	43	4	21	9	56		
		L	20	2	2	2	22		



## Appendix D--(continued)

PERSONALITY INVENTORY - STUDENT RESPONSES  
PREFERENCES

ITEM	DESCRIPTION	GROUP	choices					K-S D	level of significance
			1	2	3	4	5		
11	pet	H	0	2	22	14	8	.357	.01
		M	33	3	70	36	21		
		L	1	0	24	18	5		
57	Food	H	6	19	17	1	3	.352	.01
		M	17	52	58	1	4		
		L	10	18	18	2	0		
58	Music	H	2	22	11	9	2	.225	.01
		M	8	74	23	14	14		
		L	1	34	4	5	4		
59	Camping sites	H	17	1	13	13	2	.293	.01
		M	74	6	17	33	3		
		L	20	1	16	8	2		
61	Gifts	H	27	7	1	9	2	.286	.01
		M	64	21	7	34	7		
		L	19	6	7	10	6		
56	Occupation	H	6	20	13	2	5	.238	.01
		M	18	61	20	18	16		
		L	6	33	1	3	5		
54	Study method	H	8	5	1	12	20	.179	.01
		M	31	25	4	23	50		
		L	15	4	2	15	11		
53	Private or group work	H	23	14	1	5	3	.326	.01
		M	52	38	10	13	20		
		L	24	13	4	2	5		
24	Personality trait	H	8	11	5	13	9	.097	.05
		M	17	30	27	47	12		
		L	6	9	6	25	2		
12	Collections	H	18	0	11	2	15	.225	.01
		M	56	9	21	4	43		
		L	2	2	2	2	20		



## Appendix D--(Continued)

PERSONALITY INVENTORY - STUDENT RESPONSES								FAMILY-LIVING EXPERIENCES	
ITEM	DESCRIPTION	GROUP	1	2	3	4	5	K-S D	level of significance
45	Visiting relatives	H M L	3 14 4	13 26 13	12 34 17	15 53 11	3 6 3	.145	.01
46	Corresponding with relatives	H M L	3 9 2	5 12 9	6 37 7	23 58 23	9 17 7	.203	.01
47	Outdoor activities	H M L	11 26 12	7 27 10	7 13 4	17 52 18	4 15 4	.097	.01
48	Church, games and concerts	H M L	5 18 2	8 24 9	8 25 9	21 46 16	4 20 12	.123	.01
49	Indoor activities	H M L	24 77 25	8 18 7	7 24 9	5 9 6	2 5 1	.278	.01
51	Family discussion	H M L	15 31 11	15 38 17	6 33 7	7 19 11	3 12 2	.163	.01
60	Gifts received	H M L	1 5 1	34 84 31	2 13 4	3 6 6	6 24 6	.294	.01



## Appendix D--(Continued)

PERSONALITY INVENTORY - STUDENT RESPONSES									
INDEPENDENCE- ATTITUDES									
ITEM DESCRIPTION GROUP			1	2	choices			K-S D	level of significance
					3	4	5		
38	Selection of clothes	H	34	11	1	4	34	.357	.01
		M	95	32	6	00	0		
		L	34	10	2	1	1		
39	Attempted decisions	H	9	15	15	6	1	.194	.01
		M	18	31	49	31	4		
		L	9	10	14	13	2		
40	Successful decisions	H	6	10	21	28	1	.264	.01
		M	9	15	59	37	12		
		L	2	5	24	14	2		
41	Financial independence	H	5	13	2	18	8	.145	.01
		M	13	39	24	36	21		
		L	1	8	15	14	10		
42	Choice of friends	H	27	11	2	2	4	.344	.01
		M	67	24	7	10	25		
		L	29	8	3	6	2		
36	Method of protest	H	0	0	5	20	21	.546	.01
		M	2	0	4	80	47		
		L	0	0	1	29	18		
29	Attitude toward fads	H	2	4	0	7	33	.520	.01
		M	6	18	2	7	100		
		L	3	11	0	4	30		
34	Attitude towards reports	H	9	15	6	1	15	.163	.01
		M	22	36	27	3	45		
		L	7	10	6	3	22		
55	Attitude towards responsibility	H	8	23	9	3	3	.322	.01
		M	16	80	21	10	6		
		L	11	25	9	3	0		
52	Congeniality	H	28	16	1	1	0	.564	.01
		M	78	53	1	0	1		
		L	26	17	3	1	1		
14	Attitudes towards subject areas	H	18	9	7	9	3	.176	.01
		M	50	24	12	40	7		
		L	17	9	4	16	2		





## APPENDIX E

PERSONALITY INVENTORY-STUDENT RESPONSES<sup>1</sup>  
 PERSONALITY TRAITS PREFERRED IN FRIENDS  
 ITEMS 19, 21, 22, 23

	TOTAL GROUP			MALE GROUP			FEMALE GROUP		
	H	M	L	H	M	L	H	M	L
N	48	133	48	14	54	28	32	79	20
Firmness	1	0	0	0	0	0	1	0	0
Ability to communicate	14 <sup>o</sup>	34	9	3	15	7	11 <sup>o</sup>	19	2
Flexibility	4	9	5	3	5	3	1	4	2
Enthusiasm	14 <sup>o</sup>	26	11	4 <sup>o</sup>	10	7	10 <sup>o</sup>	16	5
Loyalty	13	64	22*	4 <sup>o</sup>	24	11*	9	40	11*
Efficiency	0	1	1	0	1	1	0	0	0
Truthfulness	17 <sup>o</sup>	42	19*	4	12	7	14*	30	12*
Open-mindedness	11	30	11	7*	12	6	4	18	5
Intelligence	3	14	5	0	9	5	3	5	0
Sense of humor	14 <sup>o</sup>	46	12	3	20	9*	11	26	3
Confidence	6	13	5	2	2	2	4	11	3
Imagination	4	9	4	2	0	4	2	9	0
Easy to get along with	26*	87	32*	7*	43	18*	19*	44	14*
Ability to trust others	7	15	7	3	5	4	4	10	3
Insightfulness	3	9	0	0	4	0	3	5	0
Purposefulness	4	21	8	0	13	3	4	8	5
Patience	5	20	6	3	8	4	2	12	2
Forcefulness	0	4	2	0	1	2	0	3	0
Resourcefulness	21 <sup>o</sup>	22	19 <sup>o</sup>	8*	22	14*	13 <sup>o</sup>	20	5
Ability to listen	16 <sup>o</sup>	46	13 <sup>o</sup>	3	10	5	13 <sup>o</sup>	36	8*

\* first choice

<sup>o</sup> divided first choice



## Appendix E--(Continued)

PERSONALITY INVENTORY-STUDENT RESPONSES<sup>1</sup>  
 PERSONALITY TRAITS PREFERRED IN PARENTS  
 ITEMS 15, 16, 17, 18

	TOTAL GROUP			MALE GROUP			FEMALE GROUP		
	H	M	L	H	M	L	H	M	L
N	46	133	48	14	54	28	32	79	20
Firmness	2	7	3	1	3	2	1	4	1
Ability to communicate	28	78	29	5 <sup>0</sup>	35	16*	23*	43	13*
Flexibility	7	28	8	5 <sup>0</sup>	9	7	2	19	1
Enthusiasm	6	16	4	1	5	2	5	11	2
Loyalty	3	4	4	2	2	1	1	2	3
Efficiency	3	5	0	1	3	0	2	2	0
Truthfulness	6	11	7	3	2	3	3	9	4
Open-mindedness	27*	88	29*	8*	39	17*	19*	49	12*
Intelligence	6	14	9	2	6	6	4	8	3
Sense of humor	2	15	3	0	4	2	2	11	1
Confidence	9	19	19*	2	8	11*	7	11	8 <sup>0</sup>
Imagination	4	5	0	2	4	0	2	1	0
Easy to get along with	11 <sup>0</sup>	42	10	3	19	8	8 <sup>0</sup>	23	2
Ability to trust others	10	32	11	2	7	4	8 <sup>0</sup>	25	7 <sup>0</sup>
Insightfulness	12 <sup>0</sup>	35	8	5*	16	5	7	19	3
Purposefulness	3	10	4	0	6	3	3	4	1
Patience	24*	56	26*	6*	17	14*	18*	38	12*
Forcefulness	1	5	1	1	3	1	0	2	0
Resourcefulness	7	19	6	4	11	5	3	8	1
Ability to listen	11	44	19	3	17	5	8	27	6



## Appendix E--(Continued)

PERSONALITY INVENTORY-STUDENT RESPONSES<sup>1</sup>  
 PERSONALITY TRAITS PREFERRED IN TEACHERS  
 ITEMS 25, 26, 27, 28

	TOTAL GROUP			MALE GROUP			FEMALE GROUP		
	H	M	L	H	M	L	H	M	L
N	46	133	48	14	54	28	32	79	20
Firmness	5	10	4	0	4	3	5	6	1
Ability to communicate	29*	77	27*	8*	29	14*	21*	48	13*
Flexibility	5	27	13	4	13	8	1	14	5
Enthusiasm	7	17	4	2	6	3	5	11	1
Loyalty	0	2	0	0	2	0	0	0	0
Efficiency	15°	41	17°	2	17	10	13°	24	7°
Truthfulness	1	3	1	0	0	1	1	3	0
Open-mindedness	19°	47	17°	8*	20	10	11°	27	7°
Intelligence	3	9	4	2	4	3	1	5	1
Sense of humor	8	33	9	2	13	4*	6	20	5
Confidence	11	28	11	5°	13	7	6	15	4
Imagination	10	21	10	1	7	5	9°	14	5
Easy to get along with	15*	53	15*	5°	21	8*	10°	32	7*
Ability to trust others	1	10	2	1	5	1	0	5	1
Insightfulness	9	21	10	2	8	7	7	13	3
Purposefulness	4	17	6*	0	7	4*	4*	10	2
Patience	17°	52	20*	5	22	10*	12*	30	10*
Forcefulness	5	12	8	0	5	8	5	7	0
Resourcefulness	14°	35	8	8*	15	5	6	20	3
Ability to listen	6	17	6	1	5	1	5	12	5





## APPENDIX F

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 ANALYSIS OF VARIANCE FOR PRE-TEST TOTAL  
 CREATIVITY FOR GROUPS X AND Y
 

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Source	df	MS	F
Group	1	0.316	11.04***
Within	225	0.286	
Total	226		

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 \*\*\* significant at the .001 level
 

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 ANALYSIS OF VARIANCE FOR POST-TEST TOTAL  
 CREATIVITY USING PRE-TEST AS COVARIANTS FOR GROUPS X AND Y
 

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Source	df	MS	F
Group	1	0.733	.382
Within	224	0.192	

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**B29890**